To: jblend@mt.gov[jblend@mt.gov]; Laidlaw, Tina[Laidlaw.Tina@epa.gov]
Cc: Clark, Dave[Dave.Clark@hdrinc.com]; Suplee, Mike[msuplee@mt.gov]
From: McInnis, Amanda
Sent: Wed 7/10/2013 8:35:04 PM
Subject: US Conference of Mayors, AWWA, and WEF Affordability Assessment Tool
Copy of AffordabilityWorkbook5.xlsx
Affordability-IssueBrief.pdf
Affordability-Report.pdf
Affordability-Workbook2.pdf
Copy of AffordabilityWorkbook1.xlsx
Copy of AffordabilityWorkbook3.xlsx
Copy of AffordabilityWorkbook4.xlsx

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Jeff and Tina—

Attached is the information I referenced yesterday about an alternative affordability assessment tool.

Amanda

From: Clark, Dave
Sent: Wednesday, June 26, 2013 5:48 PM
To: McInnis, Amanda; Stober, Trent; Chapman, Matt; Kyle, Ted; Close, Craig; Pessina, Michael; Brooks, Richard L.; Lykens, Kenneth; Holland, Jeremy (Portland); Stonehouse, Greg; Olson, Dan; Frissora, Joseph; Kalisiak, Kip; Gilbert, Susan; Ellmers, Glen E.; Talbot, Peter; Stein, Julie; Marroquin, Shirley; Duffy, Jennifer; Frommer, Jennifer; Bill, Eric; Larocque, Stephane; Dwyer, Blaine
Cc: Hammond, Dave; Willey, Bruce
Subject: US Conference of Mayors, AWWA, and WEF Affordability Assessment Tool

The US Conference of Mayors, the American Water Works Association and the Water Environment Federation have published a joint affordability analysis for utilities to assess compliance with EPA requirements. I believe that this is the document that was referenced in the EPA Region 10 Integrated Planning Workshop held in collaboration with NACWA, Oregon ACWA, and WEF we attended in Portland in April.

http://www.awwa.org/resources-tools/water-utility-management/affordability-assessment.aspx

The assertion is that EPA's affordability criteria rely too heavily on median household income and underestimate the effect of rising water bills on low-income, fixed-income, and renter-occupied households. This joint issue brief offers several alternative metrics for better gauging the affordability of water mandates:

℣   As a percentage of income for potentially vulnerable populations

℣   Across neighborhoods known to be economically at risk

℣   Through a variety of other indicators such as the unemployment rate and the percentage of households receiving public assistance The Affordability Assessment Tool and spreadsheets are attached for your reference and use. I think it will be interesting to apply this tool to cases where

we are considering Integrated Plans to see where affordability limits are reached, or exceeded, when we evaluate the combined regulatory compliance requirements for wastewater treatment, nutrient removal, CSO/SSO control, stormwater compliance, etc.

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Workbook 5: EPA's Secondary Screening Analysis

utility/municipality's Financial Capability Indicators (FCI).
The first spreadsheet in this workbook provides electronic version of EPA's FCI. The FCI score is automatically ca
Spreadsheets 1 through 5 provide guidance for assessing each of EPA's utility financial capability indicators, as f

Spreadsheet 1: EPA's Financial Capability Indicators
Spreadsheet 2: Bond rating
Spreadsheet 3: Net debt as a percentage of full market property value (FMPV)
Spreadsheet 4: Unemployment and median household income (MHI) – EPA's Socioeconomic Indicators
Spreadsheet 5: Property tax revenue as a percentage of FMPV
Spreadsheet 6: Tax revenue collection rate

Within each spreadsheet, values that need to be update/input by the user are highlighted in blue
Values that are automatically calculated are highlighted in grey

Throughout this workbook, we have inserted hypothetical numbers so that the cells calculate properly.

lculated as you work through the remaining spreadsheets.

ty indicators, as follows:

1. EPA's Utility Financial Capability Indicators

This worksheet will automatically calculate as the remaining sheets are filled out

Financial indicator	Actual Value	Score
Summary bond rating	0	2
Overall net debt as a percent of Full Market Property Value	0.1	0
Unemployment Rate	0.105	1
Median Household Income	$ 46,350.00	2
Property Tax Revenues as a Percent of Full Market Property Value	2%	2
Property Tax Revenue Collection Rate	97%	2
	Overall Score:	1.500

2. Bond Rating (Worksheet 3 in EPA's 1997 Guidance)

Inputs		
	General obligation bond	**Revenue (water/sewer) bond**
Most recent rating		
Date		
Rating agency (Moody's or S&P)		
Bond insurance (y/n) (Revenue bonds only)		

Summary bond rating	
EPA Score/Rating	2

Data Sources
Municipal bond reports from rating agencies provide recent ratings
Moody's Investors rating service: http://www.moodys.com/   S&P rating service: http://www.standardandpoors.com/

EPA Scoring Criteria		
	Bond ratings (S&P)	**Bond ratings (Moody's)**
Weak (1)	BB–D	Ba–C
Mid-range (2)	BBB	Baa
Strong (3)	AAA–A	Aaa–A

EPA Rating for Your Community:	2

3. Overall Net Debt as a Percentage of FMPV (Worksheet 4 in EPA 1997 Guid

Direct Net Debt (G.O. Bonds Excluding Double-Barreled Bonds)	$ 10,000,000
Debt of Overlapping Entities (Proportionate Share of Multijurisdictional Debt)	$ 5,000,000
Overall Net Debt	$ 15,000,000
Market Value of Property	$ 150,000,000
Overall Net Debt as a Percentage of Full Market Property Value (Line 403/Line 404*100)	10%

To calculate your utility/municipality share of debt from overlapping entities:
supported by your utility's service area (Column A)
outstanding debt since it represents periodic deposits into an account to ensure
the availability of sufficient monies to make timely debt service payments.
to persons or property within your service area in Column C. This is based on the
estimated fair market value of real property of the respective jursidictions.
4. Multiply the total outstanding debt of each overlapping entitiy by the percentage identified for your service
5. Add the figures to calculate total overlapping debt for your service area

A. Overlapping entities	B. Outstanding debt (less sinking fund)	C. Percent chargeable to your service area
County		
School District		
Total overlapping debt		

Data Sources
Debt information should be available from the financial statements of your community. In most cases, the most recent financial statements are on file with the state (e.g., the State Auditor's Office). Property assessment data should be readily available through the community or state assessor's office.

EPA Scoring Criteria	
	Net debt as a % of FMPV
Weak (1)	Above 5%

Mid-range (2)	2–5%
Strong (3)	Below 2%

EPA Rating for Your Community: | |

partially supported by your utility's service area (Column A)

overlapping entity in Column B. Money in a sinking fund is not included in the outstanding debt since
of sufficient monies to make timely debt service payments.
t charged to persons or property within your service area in Column C. This is based on the estimated

percentage identified for your service area (Column B * Column C)
ea

D. Outstanding debt attributable to permitee's service area
$ -
$ -
$ -

4. Socioeconomic Indicators: Unemployment and MHI

Unemployment (Worksheet 5 in EPA Guidance)

Annual average unemployment rate (service area/community)	10.5%
Annual average national unemployment rate	9.0%
Difference	1.5%

MHI (Worksheet 6 in EPA Guidance)

MHI for your community	
Census Year MHI	$ 45,000
MHI Adjustment Factor	1.03
Adjusted MHI	$ 46,350
National MHI	
Census Year MHI	$ 50,000
MHI Adjustment Factor	1.03
Adjusted MHI	$ 51,500
Percent difference in MHI for U.S. and your community	11%

Data Sources

Unemployment	MHI
Unemployment data are available through the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS) program. LAUS is a federal–state cooperative effort that maintains employment statistics for Census regions and divisions (e.g., counties, metropolitan statistical areas), cities of 25,000 population or more, and other areas.	ACS, single-year, 3-year average, 5-year average estimates, depending on the size of your community

EPA Scoring Criteria

	Unemployment
Weak (1)	More than 1 percentage point above the national average
Mid-range (2)	+/- 1 percentage point of the national average

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Strong (3)	More than 1 percentage point below the national average

	Unemployment
EPA Rating for Your Community:	1

Note: The MHI calculation is shown as it is written in the EPA Guidance, however, the Decennial Census no longer reports income statistics. The most recent year income from the U.S. Census American Community Survey (ACS) should be used in this calculation. A CPI adjustment can be applied to inflate the previous year's data to the current year (e.g., from 2011 to June 2012) See Workbook 1 for more information on inflating to the current year.

MHI
More than 25% below national MHI
+/- 25% of national MHI

More than 25% above
national MHI

MHI
2

5. Property Tax Revenues as a Percentage of Fair Market Property Value (Wo

Full Market Property Value (FMPV)	$ 150,000,000
Property tax revenue	$ 3,000,000
Property tax revenue as a percent of FMPV	2.0%

Data Sources

Property assessment data (i.e., FMPV) should be readily available through your community or state assessor's office. Property tax revenues should be available in your community's annual financial statements. Occasinally, the assessment and tax revenue data for communities partially served by a utility may have to be prorated to provide a clearer picture of the permittee's property tax revenue collection rate.

EPA Scoring Criteria

	Property tax revenue as a % of FMPV
Weak (1)	Above 4%
Mid-range (2)	2–4%
Strong (3)	Below 2%

EPA Rating for Your Community:	2

lue (Worksheet 7 in EPA Guidance)

6. Property Tax Revenue Collection Rate (Worksheet 8 in EPA's 1997 Guidanc

Property tax revenue collected	$ 3,000,000
Property taxes levied	$ 3,100,000
Property tax revenue collection rate	97%

Data Sources

Property taxes levied can be computed by multiplying the assessed value of real property by the property tax rate. These data should be available from your community's financial statements or the State assessor's office. Property tax revenue should be available in your community's financial statements. Occasinally, the assessment and tax revenue data for communities partially served by a utility may have to be prorated to provide a clearer picture of the permittee's property tax revenue collection rate.

EPA Scoring Criteria

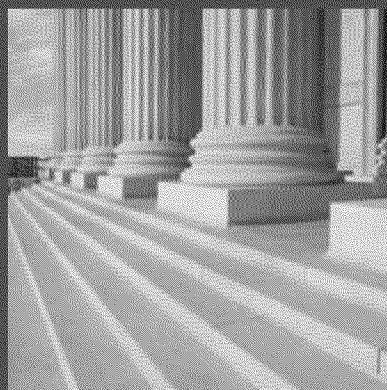|	Property tax revenue collection rate
Weak (1)	Below 94%
Mid-range (2)	94–98%
Strong (3)	Above 98%

EPA Rating for Your Community:	**2**

8 in EPA's 1997 Guidance)

Assessing the Affordability of Federal Water Mandates

An Issue Brief

The United States Conference of Mayors

American Water Works Association

Water Environment Federation®
the water quality people®

Prepared for

The United States Conference of Mayors,
the American Water Works Association,
and the Water Environment Federation
by Stratus Consulting, Boulder, Colorado

0016038

Assessing the Affordability of Federal Water Mandates

Communities and the water agencies that serve them have limited resources, so the investments they make need to address the most important risks to public health and the environment and deliver maximum benefits at affordable cost. This issue brief summarizes the U.S. Environmental Protection Agency's (EPA's) methods for analyzing the affordability of federal mandates stemming from the Clean Water Act and Safe Drinking Water Act. The paper describes the Agency's current policies, offers a critique, and identifies a number of alternatives that might be more suitable for analyzing the affordability of water and wastewater mandates on American communities. Finally, the paper notes the importance of weighing the benefits as well as the costs of federal mandates while considering their affordability.

This paper is the result of a collaborative effort by the United States Conference of Mayors (USCM), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). Its purpose is to raise issues and provoke discussion. It does not represent the official policy of these organizations or their members. The three associations also offer to their members, separately, an affordability assessment tool that allows communities to directly assess the affordability of water and wastewater mandates after considering the issues raised in this paper. Unless otherwise noted, the term "water" is used throughout this paper to mean drinking water, wastewater, and stormwater.

Background

Investment to meet federal water and wastewater requirements can impose significant financial hardships on households, businesses, and the broader communities in which they are located. When communities face large—and sometimes multiple—federal water mandates, the combined impact of the required expenditures can be extremely expensive for everyone in that community who pays a water or wastewater bill (most consumers get one combined bill for water and wastewater services). For the utility, the cumulative suite of required investments not only strains fiscal capacity but may also displace other important investments, including critical but nonmandatory capital improvement and infrastructure renewal projects. For the greater community, mandatory investments may also squeeze out other important priorities, such as social safety net programs and economic development efforts. For the residents and businesses in affected cities, the capital and operating expenses associated with federal mandates are often reflected in water and wastewater bills that must grow faster than household incomes and the general rate of inflation. Very significant affordability challenges are often created, particularly for lower-income households.

With the intention of providing a mechanism for relieving undue economic stress in the face of water mandates, EPA has developed "affordability" criteria to indicate when such mandates would cause substantial and widespread economic distress in the community. In those cases, the Agency might be willing to exercise some flexibility in the mandate, such as allowing a longer timeframe to achieve compliance with wastewater and stormwater requirements. The affordability of drinking water requirements is handled differently and can—at least in theory and case-by-case—affect the kind of technology that must be deployed in some small communities.

If EPA affordability criteria functioned properly, the economic hardship imposed on lower-income households might be alleviated in many communities by relaxing compliance requirements or stretching them out over a longer time frame. Unfortunately, there are several critical limitations to how EPA defines affordability and applies its assessment criteria. This is due in part to EPA's reliance on metrics such as median household income (MHI), which is highly misleading as an indicator of a community's ability to pay. As a result, regulatory relief is not provided in many communities where substantial and widespread economic hardships are indeed being created.

EPA's Two-level Affordability Screening Analysis for Wastewater and Combined Sewer Overflow (CSO) Controls

In 1995, EPA published its first set of affordability-related guidelines: *The Interim Economic Guidance for Water Quality Standards.* The 1995 Guidance contains a detailed discussion of the analyses a municipality should undertake to evaluate the economic impact of complying with water quality standards (WQS) under the Clean Water Act (CWA). In 1997, EPA published *Guidance for Financial Capability Assessment and Schedule Develop - ment* using a nearly identical approach to assess whether an extended compliance schedule might be granted to a community facing affordability problems. The analyses put forth in these guidance documents are divided into two parts:

1. The "preliminary screen" examines affordability using a factor called the Residential Indicator (RI). The RI weighs the average per household cost of wastewater bills relative to median household income in the service area. Ultimately, an RI of 2% or greater is deemed to signal a "large economic impact" on residents, meaning that the community is likely to experience economic hardship in complying with federal water quality standards.

2. A "secondary screen" examines metrics related to the financial capability of the impacted community. This screen applies a Financial Capability Indicator (FCI) reflecting the average of six economic indicators. Those indicators include the community's bond rating, its net debt, its median household income, the local unemployment rate, the service area's property tax burden, and its property tax collection rate. Each indicator is assigned a score of 1 to 3, based on EPA-established benchmarks. Lower FCI scores imply weaker economic conditions and thus an increased likelihood the man - date would cause substantial and widespread economic impact on the community or service area.

The results of the RI and the FCI are ultimately combined into an overall rating based on EPA's Financial Capability Matrix. This rating is intended to demonstrate the overall level of financial burden imposed on a community by compliance with Clean Water Act mandates.

EPA's Assessment of Affordability for Drinking Water Regulations

Whereas EPA's consideration of affordability for waste-water and CSO compliance is aimed at assessing an individual community's ability to comply with regulatory mandates and schedules, EPA's consideration of afford-ability in the context of potable water supply is limited to assessing the *national-level affordability of regulatory options for small communities.* EPA does not consider the affordability of drinking water requirements in any manner that pertains to individual utilities (even small ones), or to the category of medium and large utilities.

EPA has stated that it would consider a National Primary Drinking Water Regulation to be unaffordable to small communities (those with populations under 10,000) if the standard would result in a household drinking water bill in excess of 2.5% of the national average MHI in such communities. To date, EPA has never made this finding. If EPA were to make such a finding, it would be required to identify technologies for small systems that might not result in meeting particular drinking water standards but are found to protect public health. Then, on a case-by-case basis, states may approve the use of such affordable small system technologies (called a variance) or approve an extended deadline for compliance (called an exemption).

States cannot approve both a variance and an exemption for the same standard in the same community. Variances are subject to review and approval by EPA. States have allowed very few variances and exemptions because they can be difficult and expensive to issue.

EPA's stated view on potable water—that it is affordable if it costs less than 2.5% of small community MHI—in - fluences the perceived affordability of combined water and wastewater bills. Specifically, it is inferred that EPA would consider a combined annual water and wastewater bill of less than 4.5% of MHI to be affordable (2.5% for water, plus 2% for wastewater services and CSO controls).

Limitations of EPA's Preliminary Screening Approach

A central issue in assessing affordability of federal water mandates is the reasonableness of community-wide MHI as a primary yardstick. MHI can be a highly misleading indicator of a community's ability to pay for several reasons.

- ***MHI is a poor indicator of economic distress and bears little relationship to poverty or other measures of economic need within a community.*** For example, consider an analysis of MHI and poverty data for the 100 largest cities in the United States. It shows that for 21 cities identified as having an MHI within $3,000 of the 2010 national MHI ($50,046), there is no discernible relationship between MHI and the incidence of poverty. Statistical analysis confirms that the correlation between MHI and poverty among these cities is not meaningful, with a correlation coefficient (r) of 0.024. Indeed, within these 21 cities, the poverty rate ranges from a low of 14.1% to a high of 23.3%.

- ***MHI does not capture impacts across diverse populations.*** In many cities, income levels are not clustered around the median, but are spread over a wide income range or concentrated at either end of the income spectrum. This tendency for the income distribution to spread away from the middle has been increasing and may well continue to increase in the future, making MHI an even less meaningful metric. In addition, income distribution and other economic measures can vary widely across different districts and neighborhoods within a city. Thus, the economic hardship associated with increasing water and wastewater bills can be concentrated in a few lower-income neighborhoods. This will compound the economic hardship within the community and may raise issues of environmental justice (EJ). These impacts are not captured with the use of service area MHI as a sole indicator.

- ***MHI provides a "snapshot" that does not account for the historical and future trends of a community's economic, demographic, and/or social conditions.*** This is particularly relevant in areas that may be experiencing economic declines or population losses (which will result in the costs of water and wastewater programs being spread across fewer residents). Without consideration of these and other economic and demographic trends, the affordability determination will overestimate the ability of residents to tolerate rate increases over time.

- ***MHI does not capture impacts to landlords and public housing agencies.*** Many renters do not receive water bills because water and wastewater service is included in the cost of rent. The same is true of many residents in public housing. In cities with a high percentage of renters and/or public housing residents, use of MHI and RI does not capture impacts to landlords and public housing agencies, which must often absorb the cost of increased water and wastewater bills. In many cases, higher water bills mean that public housing authorities will be required to reduce the number of needy renters they serve, unless there can be offsetting increases in public housing budgets.

- ***The RI does not fully capture household economic burdens.*** Economic burdens are commonly measured by comparing the costs of particular necessities to available household income. The RI is such a measure in that it is used to evaluate the economic burden from water bills by comparing those bills to MHI. However, there can be situations where the economic burdens in a community are substantially different from those typically associated with its RI. For example, a community may experience unusually high costs of basic necessities or may have a distribution of household income that differs significantly from that in most communities. In these cases, the standard application of EPA's RI would be insufficient on its own to distinguish between higher and lower levels of economic impact.

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Alternative Household Affordability Metrics:
Moving Beyond EPA's Criteria

Given the limitations of the RI, and in particular the use of MHI as a primary indicator of household affordability, it is important to consider the use of alternative metrics to gauge the affordability of federal water mandates. For example, impacts on customer bills can be assessed as follows:

- **Across the income distribution.** Given the relatively large percentage of households in the lower portions of the income distribution in many cities, it is important to examine the effect of rising water bills across the entire income distribution—and especially at the lower end—rather than simply at the median. For example, a key indicator could include the analysis of average water and wastewater bills borne by each income quintile as a percentage of the average income for that quintile. The percentage of households below specific income thresholds can also be used to examine household impacts. Figure 1 illustrates this point.

  EPA's "Guidance for Preparing Economic Analyses" (240-R-00-003) recognizes the legitimacy of assessing impacts to all households across the income distribution, though EPA has not provided information on how such analyses have been conducted in the past or used in enforcement actions.

- **Across household types.** Average water and wastewater bills can be examined as a percentage of income for potentially vulnerable populations (e.g., renters and elderly households).

- **Across neighborhoods** or similar geographic units, such as Census tracts, or Public Use Microdata Areas. Poverty rates and households located in poverty areas can be considered to identify portions of communities that are economically at risk. Alternative measures of poverty, such as the Supplemental Poverty Measure (SPM) recently developed by the U.S. Census Bureau, can be especially useful in this respect. The analysis could capture affordability issues in particular parts of a community or service area that may be masked when looking at the area as a whole.

- **Other indicators** of economic need and widespread impacts can also be considered for the community or parts of the community2. These might include:

  - The unemployment rate.

  - The percentage of households receiving public assistance such as food stamps or living below the poverty level.

  - The percentage of households meeting Home Energy Assistance Program requirements.

  - The percentage of customers eligible for water affordability programs.

  - *The percentage of households paying high housing costs*—for example the percentage of households with housing costs in excess of 35% of income.

  - *Other household cost burdens such as* nondiscretionary spending as a percentage of household income for households within each income quintile (Rubin 2003).

Figure 1: Household Income Quintile Upper Limits in Atlanta, Georgia and the United States (2011$)		
	Atlanta, Georgia	United States
Lowest quintile	12,294	20,585
Second quintile	31,873	39,466
Third quintile	59,043	63,001
Fourth quintile	104,233	101,685
Lower limit of top 5%	246,335	187,087
Source: U.S. Census Bureau ACS, 2012.		

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1. The SPM includes changes in the measure of available household resources (e.g., using after-tax income instead of pre-tax income and taking into account income received through food stamps and other forms of public assistance) and also recognizes some nondiscretionary expenses that such households bear. The SPM also adjusts for different housing status (e.g., renters versus owners). Additional details can be found in the U.S. Census Bureau (2011).

2. EPA's 1995 Interim Economic Guidance for Water Quality Standards provides a good list of these indicators, also including economic losses, impacts on property values, decreases in tax revenues, and potential for future job losses, among others.

EPA's Secondary Screening Analysis: Limitations and Alternative Indicators

Just as the RI falls short of its intended purpose, so too does the Financial Capability Indicator (FCI). The FCI that makes up EPA's secondary screening analysis does not adequately reflect a community's ability to finance investments associated with federal water mandates. This measure fails to fully capture financial capability because:

- EPA uses property tax revenues as a percentage of full market property value (FMPV) as its sole measure of local tax effort. Focusing solely on property taxes—while ignoring income, sales, business taxes, and user fees typically charged for city services—inevitably understates the tax effort in cities that rely on multiple forms of taxation. As an alternative, EPA should allow municipalities to use *total local tax and fee revenues as a percentage of gross taxable resources.* This would provide a better measure of the extent to which a municipality is already using the full range of its taxable resources.

- The secondary screening analysis includes measures of local MHI and unemployment levels compared to the national average. By focusing on how these measures compare with national levels, EPA fails to acknowledge the profound impact of the absolute levels themselves. For example, if the national unemployment rate is 9%, a community with an unemployment rate of 10% is considered by EPA as having only a "mid-range" unemployment problem. In fact, a community with a 10% unemployment rate is all-but-certain to be experiencing significant distress, regardless of the national average.

  In addition to supplemental measures for MHI (as previously described), EPA should consider a metric that compares a municipality's *current* unemployment rate with the long-term state and national average (the national average was 5.8% between 1991 and 2010). Use of the *long-term* state and national averages as a benchmark would provide a more insightful socioeconomic indicator than a single current number. A community's long-term unemployment rate (for example, the share of the labor force continuously unemployed for one-half year or more) could also be evaluated.

- The FCI does not take into account any deterioration of a local government's ability to finance major capital improvements, as evidenced in municipal capital markets. EPA should consider adding a measure of local government revenue growth or decline to the FCI matrix, with a decline in real revenues over some period taken as a sign of weakened financial capacity.

- EPA's methodology for assessing municipalities' financial capabilities takes into account formal debt burden, but it does not consider what for many cities is an even greater liability: unfunded pension and health care commitments to retirees. These are generally not reflected in formal debt.

- Community or utility revenues are not considered in the secondary screening analysis. This creates a significant weakness, especially in areas that are experiencing economic difficulties, delinquency in water and wastewater payments, declining water usage, shrinking revenues, or a growing number of older customers on fixed or declining incomes. EPA should consider the addition of more appropriate measures of revenue collection, such as current delinquency rates, the agency's ability to enforce collection, and its likelihood of recovering these costs.

- EPA's secondary screening analysis does not take into account the fact that many communities have a legal debt ceiling. Debt limitations have the potential to severely limit a community's ability to finance unfunded mandates absent an extended schedule.

- Finally, EPA does not consider the longer-term needs facing many municipalities for reinvestment and renewal of water and wastewater infrastructure due to the current system's age and condition. As documented by the American Water Works Association's 2012 *Buried No Longer: Confronting America's Water Infrastructure Challenge* report (covering buried drinking water infrastructure only), these needs add up to at least $1 trillion over the next 25 years. Wastewater needs are at least as great, not counting CSO costs. The need for this investment is real and urgent.

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Weighing the Benefits of Additional Mandate-Driven Expenditures

Federal Clean Water Act and Safe Drinking Water Act mandates are intended to provide better public health protection, water quality enhancements, and other benefits. However, not all drinking water and wastewater mandates are the same. Some provide greater benefits than others, or provide benefits sooner than others, or generate benefits to different groups of people or ecosystems than others.

When communities face expensive water mandates and associated deadlines, the impact of the required expenditures can be extremely difficult for all who pay water bills, but particularly for those with lower incomes. In such communities, the expected benefits of the mandate should be carefully weighed against:

- Compliance deadlines (which might be amended).

- Permit limits (which might be adjusted).

- Required compliance technologies and strategies (some of which are more expensive than others).

- Other factors that influence the magnitude and timing of required investments.

When the costs of meeting a regulatory mandate are high, the affordability implications and the benefit of the activity should each be evaluated in concert with one another. The most important questions include:

1. Are the added benefits of more rapid and/or stringent mandates warranted given the added costs and adverse impacts on affordability, when compared to less stringent, perhaps less expensive alternatives?

2. Are projects with lower public health or environmental benefits driving out projects that might be of greater value to the community or the nation?

3. Will those who will realize most of the benefits be different than those who bear most of the costs?

4. Are those bearing the greatest burden economically disadvantaged and thus worthy of environmental justice consideration?

EPA's proposed Integrated Planning and Permit Policy (IPPP) provides one potential avenue by which the costs and benefits of all federal water mandates could be addressed. The IPPP process could be used to set priorities, make adjustments in requirements, and set reasonable timetables. Such adjustments would help ensure that local resources are used to secure the greatest public health and environmental benefits at an affordable cost. Moving the IPPP process forward as suggested offers important potential advantages:

- Comparing the environmental, social, and financial benefits of all water-related obligations would allow municipalities to develop priorities that reflect the totality of trade-offs and commitments facing the community.

- Considering all water-related obligations together, and assessing financial capability in light of total water-related obligations, would focus local resources where the community will get the greatest total environmental, public health, and other benefits.

It should be noted that EPA does not include drinking water mandates in the Integrated Municipal Stormwater and Wastewater Planning process, even though drinking water investments must be carried on the same customer bill as investments needed to comply with wastewater and CSO mandates. The USCM, AWWA, and WEF have recommended that EPA include consideration of drinking water investments in the Integrated Planning and Permit Program. The program should also consider necessary but nonmandatory investments in the on-going rehabilitation of water and wastewater infrastructure.

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Conclusion

EPA is to be commended for addressing affordability concerns. However, the continued application of EPA's current approach is inadequate. With respect to considering the impact of rising water bills on households, a basic problem is over-reliance on median household income (MHI). Rather than focusing on MHI alone, EPA should focus on households at the lower end of the income spectrum. This examination could include households with incomes below a certain threshold; households with the lowest income levels (such as the lowest quintile or decile); households with housing costs above a certain threshold (such as 35% of income); or households experiencing other types of financial distress (such as households living in areas of high poverty or unemployment). Moreover, the trend in changing household incomes, water and wastewater consumption, employment and demographics (such as population changes) should be taken into account in evaluating how household economic burdens are likely to change over time.

With respect to assessing a community's financial capability, EPA does not consider a number of important realities facing many communities today. Alternative metrics need to be considered as part of the financial capability assessment to better account for several highly relevant factors. These include the liabilities associated with unfunded municipal pension obligations and other long-term contractual commitments. Finally, the long-term need to reinvest in aging water and wastewater infrastructure to ensure systems are sound and resilient also should be considered.

Including in EPA's analysis a number of additional and alternative measures as described in this paper would significantly improve the Agency's understanding of the affordability of federal water mandates in American communities.

Finally, although this paper focuses on EPA's analysis of residential affordability, it has to be noted that affordability impacts on other customer classes—such as commercial and industrial customers—can be dramatic. In turn, those impacts can significantly affect the economic health and vitality of a community now and into the future.

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Affordability Assessment Tool

The United States Conference of Mayors, the American Water Works Association, and the Water Environment Federation have collaborated in the development of an Affordability Assessment Tool that allows our members to consider many of the alternative factors discussed in this paper and better understand the full range of affordability implications for the federal water mandates they face. To access this tool, visit usmayors.org, awwa.org, or wef.org.

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Affordability Assessment Tool
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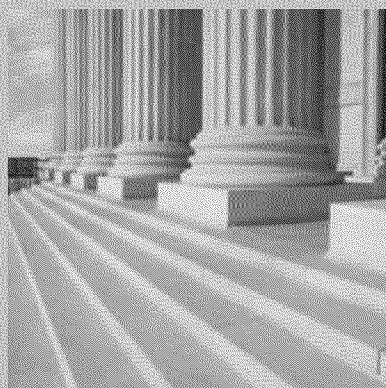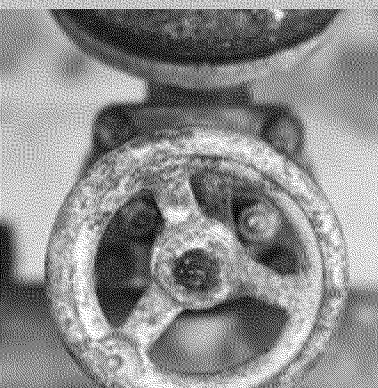
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Chapter 2: Guidance for Developing EPA's Residential Indicator provides detailed guidance for completing EPA's preliminary screening analysis for affordability.

Chapter 3: Primary Data Sources for Developing Alternative Measures of Household Affordability describes the data sources that can be used to develop alternative indicators and measures of household affordability for individual communities.

Chapter 4: Guidance for Analyzing Socioeconomic Indicators of Household Affordability for Your Community focuses on the analysis of socioeconomic indicators that can help to provide a more complete picture of economic need within your community.

Chapter 5: Guidance for Developing Alternative Measures of Household Affordability provides guidance for developing specific household affordability metrics.

Chapter 6: Guidance for Assessing Utility Financial Capability: EPA's Secondary Screening Analysis and Alternative Measures provides specific guidance for analyzing utility financial capability, including EPA-suggested metrics and alternative approaches.

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List of Acronyms and Abbreviations

ACCRA   American Chamber of Commerce Research Association
ACS   American Community Survey
AFF   American Fact Finder
AWWA   American Water Works Association
BLS   Bureau of Labor Statistics
CES   Consumer Expenditure Survey
COLI   Cost of Living Index
CSO   Combined Sewer Overflow
CPH   cost per household
CPI   consumer price index
CWA   Clean Water Act
EJ   environmental justice
EPA   U.S. Environmental Protection Agency
FCI   Financial Capability Indicators
FMPV   fair market property value
GIS   geographic information systems
GO   general obligation
IPMS   Integrated Public Use Microdata Series
IPPP   Integrated Planning and Permit Policy
LAUS   Local Area Unemployment Statistics
MHI   median household income
MOE   margin of error
O&M   operations and maintenance
PUMA   Public Use Microdata Area
RI   Residential Indicator
SDWA   Safe Drinking Water Act
SPM   Supplemental Poverty Measure
USCM   U.S. Conference of Mayors
WEF   Water Environment Federation
WQS   water quality standards
WWT   wastewater

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Chapter 1

Assessing the Affordability of Federal Water Mandates

Communities and the water agencies that serve them have limited resources, so the investments they make need to address the most important risks to public health and the environment and deliver maximum benefits at a cost that is affordable. This Water Mandates Affordability Assessment Tool (Assessment Tool) is the result of a collaborative effort by the United States Conference of Mayors (USCM), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). Its purpose is to raise issues, provoke discussion and provide alternative ways to view the affordability of federal water mandates in any given community. It does not represent the official policy of the sponsoring organizations or their members.

This chapter summarizes the U.S. Environmental Protection Agency's (EPA's) methods for analyzing the affordability of federal mandates stemming from the Clean Water Act (CWA) and Safe Drinking Water Act (SDWA). It describes the Agency's current policies, offers a critique, and identifies a number of alternatives that might be more suitable for analyzing the affordability of water and wastewater mandates on American communities. Finally, this chapter notes the importance of weighing benefits as well as costs when considering federal water mandates. As the reader will note, the term "water" is used throughout the Assessment Tool to mean drinking water, wastewater, and stormwater, unless otherwise noted.

Background

Investment to meet federal water and wastewater requirements can impose significant financial hardships on households, businesses, and the broader communities in which they are located. When communities face large—and sometimes multiple—federal water mandates, the combined impact of the required expenditures can be extremely expensive for everyone in that community who pays a water or wastewater bill (most consumers get one combined bill for water and wastewater services). For the utility, the cumulative suite of required investments not only strains fiscal capacity but may also displace other important investments, including critical but nonmandatory capital improvement and infrastructure renewal projects. For the greater community, mandatory investments may also squeeze out other important priorities, such as social safety net programs and economic development efforts. For the residents and businesses in affected communities, the capital and operating expenses associated with federal mandates are often reflected in water and wastewater bills that must grow faster than household incomes and the general rate of inflation. Very significant affordability challenges are often created, particularly for lower-income households.

With the intention of providing a mechanism for relieving undue economic stress in the face of wastewater-related mandates, EPA has developed "affordability" criteria to indicate when such mandates would cause substantial and widespread economic distress in the community. In the case of undue economic stress caused by wastewater requirements, the Agency might be willing to exercise some flexibility in the mandate by allowing a longer timeframe to achieve compliance or by relaxing compliance standards. The affordability of drinking water requirements is handled differently and can—at least in theory and case-by-case—affect the kind of technology that must be deployed in some small communities.

If EPA affordability criteria functioned properly, the economic hardship imposed on lower-income households might be alleviated in many communities. Unfortunately, there are several critical limitations to how EPA defines affordability and applies its assessment criteria. This is due in part to EPA's reliance on metrics such as median household income (MHI), which is highly misleading as an indicator of a community's ability to pay. As a result, regulatory relief is not provided in many communities where substantial and widespread economic hardships are indeed being created.

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EPA's Two-level Affordability Screening Analysis for Wastewater and Combined Sewer Overflow (CSO) Controls

In 1995, EPA published its first set of affordability-related guidelines: The Interim Economic Guidance for Water Quality Standards. The 1995 Guidance contains a detailed discussion of the analyses a municipality should undertake to evaluate the economic impact of complying with water quality standards (WQS) under the CWA. In 1997, EPA published Guidance for Financial Capability Assessment and Schedule Development using a nearly identical approach to assess whether an extended compliance schedule might be granted to a community facing afford- ability problems. The analyses put forth in these guidance documents are divided into two parts:

1. The preliminary screen examines affordability using a factor called the Residential Indicator (RI). The RI weighs the average per household cost of wastewater bills relative to median household income in the service area. Ultimately, an RI of 2% or greater is deemed to signal a "large economic impact" on residents, meaning that the community is likely to experience economic hardship in complying with federal water quality standards.

2. A secondary screen examines metrics related to the financial capability of the impacted community. This screen applies a Financial Capability Indicator (FCI) reflecting the average of six economic indicators. Those indicators include the community's bond rating, its net debt, its MHI, the local unemployment rate, the service area's property tax burden, and its property tax collection rate. Each indicator is assigned a score of 1 to 3, based on EPA-established benchmarks. Lower FCI scores imply weaker economic conditions and thus an increased likeli- hood the mandate would cause substantial and widespread economic impact on the community or service area.

The results of the RI and the FCI are ultimately combined into an overall rating based on EPA's Financial Capability Matrix. This rating is intended to demonstrate the overall level of financial burden imposed on a community by com- pliance with CWA mandates.

EPA's Assessment of Affordability for Drinking Water Regulations

Whereas EPA's consideration of affordability for wastewa- ter and CSO compliance is aimed at assessing an individual community's ability to comply with regulatory mandates and schedules, EPA's consideration of affordability in the context of potable water supply is limited to assessing the national-level affordability of regulatory options for small communities. EPA does not consider the affordability of

drinking water requirements in any manner that pertains to individual utilities (even small ones), or to the category of medium and large utilities.

EPA has stated that it would consider a National Primary Drinking Water Regulation to be unaffordable to small communities (those with populations under 10,000) if the standard would result in a household drinking water bill in excess of 2.5% of the national MHI in such communities. In this context, MHI is evaluated based on all small commu- nity water systems collectively (i.e., MHI is not considered for any individual utility, but for all small utilities lumped together). To date, EPA has never determined that a drink- ing water regulation is unaffordable for small systems. If EPA were to make such a finding, it would be required to identify technologies for small systems that might not result in meeting a particular drinking water standard but are found to protect public health. Then, on a case-by-case basis, states may approve the use of such affordable small system technologies (called a variance) or approve an extended deadline for compliance (called an exemption). States cannot approve both a variance and an exemption for the same standard in the same community. Variances are subject to review and approval by EPA. States have allowed very few variances and exemptions because they can be difficult and expensive to issue.

EPA's stated view on potable water—that it is affordable if it costs less than 2.5% of small community MHI—influ- ences the perceived affordability of combined water and wastewater bills. Specifically, it is commonly inferred that EPA would consider a combined annual water and waste- water bill of less than 4.5% of MHI to be affordable (2.5% for water, plus 2% for wastewater services and CSO controls).

Limitations of EPA's Preliminary Screening Approach

A central issue in assessing affordability of federal water mandates is the reasonableness of community-wide MHI as a primary yardstick. MHI can be a highly misleading indi- cator of a community's ability to pay for several reasons.

• MHI is a poor indicator of economic distress and bears little relationship to poverty or other measures of econom- ic need within a community. For example, consider an analysis of MHI and poverty data for the 100 largest cities in the United States. It shows that for 21 cities identified as having an MHI within $3,000 of the 2010 national MHI ($50,046), there is no discernible relationship between MHI and the incidence of poverty. Statistical analysis confirms that the correlation between MHI and poverty among these cities is not meaningful, with a correlation coefficient (r) of 0.024. Indeed, within these 21 cities, the poverty rate ranges from a low of 14.1% to a high of 23.3%.

• MHI does not capture impacts across diverse populations. In many cities, income levels are not clustered around the median, but are spread over a wide income range or concentrated at either end of the income spectrum. This tendency for the income distribution to spread away from the middle has been increasing and may well continue to increase in the future, making MHI an even less mean - ingful metric. In addition, income distribution and other economic measures can vary widely across different dis - tricts and neighborhoods within a city. Thus, the economic hardship associated with increasing water and wastewater bills can be concentrated in a few lower-income neighbor- hoods. This will compound the economic hardship within the community and may raise issues of environmental justice (EJ). These impacts are not captured with the use of service area MHI as a sole indicator.

• MHI provides a "snapshot" that does not account for the historical and future trends of a community's economic, demographic, and/or social conditions. This is particularly relevant in areas that may be experiencing economic declines or population losses (which will result in the costs of water and wastewater programs being spread across fewer residents). Without consideration of these and other economic and demographic trends, the affordability determination will overestimate the ability of residents to tolerate rate increases over time.

• MHI does not capture impacts to landlords and public housing agencies. Many renters do not receive water bills because water and wastewater service is included in the cost of rent. The same is true of many residents in public housing. In cities with a high percentage of renters and/ or public housing residents, use of MHI and RI does not capture impacts to landlords and public housing agencies, which must often absorb the cost of increased water and wastewater bills. In many cases, higher water bills mean that public housing authorities will be required to reduce the number of needy renters they serve, unless there can be offsetting increases in public housing budgets.

• The RI does not fully capture household economic burdens. Economic burdens are commonly measured by comparing the costs of particular necessities to available household income. The RI is such a measure in that it is used to evaluate the economic burden from water bills by comparing those bills to MHI. However, there can be situations where the economic burdens in a community are substantially different from those typically associated with its RI. For example, a community may experience unusually high costs of basic necessities or may have a distribution of household income that differs significantly from that in most communities. In these cases, the standard application

of EPA's RI would be insufficient on its own to distinguish between higher and lower levels of economic impact.

Alternative Household Affordability Metrics: Moving Beyond EPA's Criteria

Given the limitations of the RI, and in particular the use of MHI as a primary indicator of household affordability, it is important to consider the use of alternative metrics to gauge the affordability of federal water, wastewater, and stormwater-related mandates. For example, impacts on customer bills can be assessed as follows:

• Across the income distribution. Given the relatively large percentage of households in the lower portions of the in- come distribution in many cities, it is important to examine the effect of rising water bills across the entire income dis - tribution—and especially at the lower end—rather than simply at the median. For example, a key indicator could include the analysis of average water and wastewater bills as a percentage of the household income for each income quintile. Table 1-1 demonstrates that this percentage would be much higher for lower income quintiles in Atlanta com- pared to national levels (e.g., the income level that defines the upper end of the lowest quintile—lowest 20% of income earners—in Atlanta is $12,294; this compares to $20,585 nationally).

Table 1-1 Household Income Quintile Upper Limits in Atlanta, Georgia, and the United States (2011$)

	Atlanta, Ga.	United States
Lowest quintile	12,294	20,585
Second quintile	31,873	39,466
Third quintile	59,043	63,001
Fourth quintile	104,233	101,685
Lower limit of top 5%	246,335	187,087

Source: U.S. Census Bureau American Community Survey, 2012.

EPA's "Guidance for Preparing Economic Analyses" (240-R- 00-003) recognizes the legitimacy of assessing impacts to all households across the income distribution, though EPA has not provided information on how such analyses have been conducted in the past or how they've been used in enforcement actions.

• Across household types. Average water and wastewa - ter bills can be examined as a percentage of income for potentially vulnerable populations (e.g., renters and elderly households).

• Across neighborhoods or similar geographic units, such as Census tracts, or Public Use Microdata Areas (PUMAs). Poverty rates and households located in poverty areas can be considered to identify portions of communities that are economically at risk. Alternative measures of poverty, such as the Supplemental Poverty Measure (SPM) recently developed by the U.S. Census Bureau , can be especially useful in this respect. The analysis could capture affordability issues in particular parts of a community or service area that may be masked when looking at the area as a whole.

Other indicators of economic need and widespread impacts can also be considered for the community or parts of the community[2]. These might include:

• The unemployment rate.

• The percentage of households receiving public assistance such as food stamps or living below the poverty level.

• The percentage of households meeting Home Energy Assistance Program requirements.

• The percentage of customers eligible for water affordability programs.

• The percentage of households paying high housing costs—for example the percentage of households with housing costs in excess of 35% of income.

• Other household cost burdens such as nondiscretionary spending as a percentage of household income for households within each income quintile (Rubin 2003).

EPA's Secondary Screening Analysis: Limitations and Alternative Indicators

Just as the RI falls short of its intended purpose, so too does the FCI. The FCI that makes up EPA's secondary screening analysis does not adequately reflect a community's ability to finance investments associated with federal water mandates. This measure fails to fully capture financial capability because:

• EPA uses property tax revenues as a percentage of full market property value (FMPV) as its sole measure of local tax effort. Focusing solely on property taxes—while ignoring income, sales, business taxes, and user fees typically charged for city services—inevitably understates the tax

effort in cities that rely on multiple forms of taxation. As an alternative, EPA should allow municipalities to use total local tax and fee revenues as a percentage of gross taxable resources. This would provide a better measure of the extent to which a municipality is already using the full range of its taxable resources.

• The secondary screening analysis includes measures of local MHI and unemployment levels compared to the national average. By focusing on how these measures compare with national levels, EPA fails to acknowledge the profound impact of the absolute levels themselves. For example, if the national unemployment rate is 9%, a community with an unemployment rate of 10% is considered by EPA as having only a "mid-range" unemployment problem. In fact, a community with a 10% unemployment rate is all-but-certain to be experiencing significant distress, regardless of the national average.

> o In addition to supplemental measures for MHI (as previously described), EPA should consider a metric that compares a municipality's current unemployment rate with the long-term state and national average (the national average was 5.8% between 1991 and 2010). Use of the long-term state and national averages as a benchmark would provide a more insightful socioeconomic indicator than a single current number. A community's long-term unemployment rate (for example, the share of the labor force continuously unemployed for one-half year or more) could also be evaluated.

> o In addition to broadening the range of labor market indicators it considers in assessing local financial capabilities, EPA should consider other measures of local economic distress, such as foreclosure rates. At the national level, foreclosure rates rose from 5.8 per 1,000 households in 2006 to 22.2 per 1,000 in 2010 (Office of the State Comptroller, 2011). In many communities, high foreclosure rates have had a significant impact on the financial condition of local governments and their ability to finance capital improvements.

• The FCI does not take into account the recent deterioration of many local governments' ability to finance major capital improvements, as evidenced in municipal capital markets. EPA should consider adding a measure of local government revenue growth or decline to the FCI matrix,

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The SPM includes changes in the measure of available household resources (e.g., using after-tax income instead of pretax income and taking into account income received through food stamps and other forms of public assistance) and also recognizes some nondiscretionary expenses that such households bear. The SPM also adjusts for different housing status (e.g., renters versus owners). Additional details can be found in the U.S. Census Bureau's Supplemental Poverty Measure (2011a).

2 EPA's 1995 Interim Economic Guidance for Water Quality Standards provides a good list of these indicators, and also includes economic losses, impacts on property values, decreases in tax revenues, and potential for future job losses, among others.

with a decline in real revenues over some period taken as a sign of weakened financial capacity.

• EPA's methodology for assessing municipalities' financial capabilities takes into account formal debt burden, but it does not consider what for many cities is an even greater liability: unfunded pension and health care commitments to retirees. These are generally not reflected in formal debt.

• Community or utility revenues are not considered in the secondary screening analysis. This creates a significant weakness, especially in areas that are experiencing economic difficulties, delinquency in water and wastewater payments, declining water usage, shrinking revenues, or a growing number of older customers on fixed or declining incomes. EPA should consider the addition of more appropriate measures of revenue collection, such as current delinquency rates, the agency's ability to enforce collection, and its likelihood of recovering these costs.

• EPA's secondary screening analysis does not take into account the fact that many communities have a legal debt ceiling. Debt limitations have the potential to severely limit a community's ability to finance unfunded mandates absent an extended schedule.

• Finally, EPA does not consider the longer-term needs facing many municipalities for reinvestment and renewal of water and wastewater infrastructure due to the current system's age and condition. As documented by AWWA's Buried No Longer report (covering buried drinking water infrastructure only), these needs add up to at least $1 trillion over the next 25 years. Wastewater needs are at least as great, not counting CSO costs. The need for this investment is real and urgent.

Weighing the Benefits of Additional Mandate-Driven Expenditures

Federal Clean Water Act and the Safe Drinking Water Act mandates are intended to provide better public health protection, water quality enhancements, and other benefits. However, not all drinking water and wastewater mandates are the same. Some provide greater benefits than others, or provide benefits sooner than others, or generate benefits to different groups of people or ecosystems.

When communities face expensive water mandates and associated deadlines, the impact of the required expenditures can be extremely difficult for all who pay water bills, but particularly for those with lower incomes. In such communities, the expected benefits of the mandate should be carefully weighed against:

• Compliance deadlines (which might be amended)

• Permit limits (which might be adjusted)

• Required compliance technologies and strategies (some of which are more expensive than others)

• Other factors that influence the magnitude and timing of required investments

When the costs of meeting a regulatory mandate are high, the affordability implications and the benefit of the activity should each be evaluated in concert with the other. The most important questions include:

1. Are the added benefits of more rapid and/or stringent mandates warranted given the added costs and adverse impacts on affordability, when compared to less stringent, perhaps less expensive alternatives?

2. Are projects with lower public health or environmental benefits driving out projects that might be of greater value to the community or the nation?

3. Are the households that will realize most of the benefits different than those who will bear most of the costs?

4. Are those bearing the greatest burden economically disadvantaged and thus worthy of environmental justice consideration?

EPA's proposed Integrated Planning and Permit Policy (IPPP) provides one potential avenue by which the costs and benefits of all federal water mandates could be addressed. The IPPP process could be used to set priorities, make adjustments in requirements, and set reasonable timetables. Such adjustments would help ensure that local resources are used to secure the greatest public health and environmental benefits at an affordable cost. Moving the IPPP process forward as suggested offers important potential advantages:

• Comparing the environmental, social, and financial benefits of all water-related obligations would allow municipalities to develop priorities that reflect the totality of trade-offs and commitments facing the community.

• Considering all water-related obligations together, and assessing financial capability in light of total water-related obligations, would focus local resources where the community will get the greatest total environmental, public health, and other benefits.

It should be noted that EPA does not include drinking water mandates in the Integrated Municipal Stormwater and

Wastewater Planning process, even though drinking water investments must be carried on the same customer bill as investments needed to comply with wastewater and CSO mandates. The USCM, AWWA, and WEF have recommended that EPA include consideration of drinking water invest-ments in the Integrated Planning and Permit Program. The program should also consider necessary but nonmandatory investments in the ongoing rehabilitation of water and wastewater infrastructure.

Chapter 2

Guidance for Developing EPA's Residential Indicator

This chapter provides an overview of the methods outlined in EPA's 1997 Guidance for Financial Capability Assessment and Schedule Development (U.S. EPA, 1997), which EPA uses for completing the preliminary screening analysis (i.e., calculating the RI). More specific instruc- tions and worksheets developed by EPA for this purpose are included in this Assessment Tool as Workbook 1, an Excel spreadsheet.

EPA's RI is intended to provide a measure of the financial impact of current and proposed wastewater treatment (WWT) and CSO controls on residential users. The calculation of the RI involves the following steps:

• Determine the average annual cost per household (CPH) associated with WWT- and CSO-related programs and services in a given community. CPH is based on the total costs for these programs, the percentage of wastewater flow attributable to residential users, and the number of households in the service area, as further explained below.

• Determine the MHI for the service-area based on data from the U.S. Census Bureau.

• Divide the CPH by the service area MHI to calculate the RI.

• Compare the RI to financial impact ranges established by EPA to determine whether unfunded mandates will produce a possible high, mid-range, or low financial impact on residential users.

It is important to note that although EPA's 1997 Guidance was developed within the context WWT and CSO controls, this Assessment Tool is focused on the affordability of both water supply and WWT (including CSO and stormwater) programs. For comparison purposes, water and wastewater utilities can calculate the average annual CPH for both types of services using the methodology outlined below.

Step 1: Develop the CPH Estimate

In its 1997 Guidance, EPA outlines the following steps for determining the average annual CPH of existing and pro- posed WWT and CSO control costs:

• Determine total WWT and CSO (and stormwater) costs by adding together the current costs for existing WWT opera - tions and projected costs for any proposed controls.

   o Current WWT costs are defined as "current annual wastewater operating and maintenance (O&M) expens - es (excluding depreciation) plus current annual debt service (principal and interest)" (1997 Guidance, p. 12).

   o EPA Guidance states that O&M expenses and debt service costs should also be estimated for all proposed projects and adjusted to current year dollars (i.e., deflated) using the average annual national Consumer Price Index (CPI) inflation rate for the last five years. Workbook 1 includes specific instructions for applying the CPI and determining annualized debt service costs.

• Calculate the residential share of the total WWT and CSO costs.

   o The residential share of total costs is computed by multiplying the percent of total wastewater flow (in - cluding infiltration and inflow) attributable to residen- tial users by the total costs.

• Calculate the CPH by dividing the residential share of the total WWT and CSO costs by the number of households within the service area.

The sources of data necessary for calculating CPH will vary somewhat by utility/municipality. Table 2-1 provides a summary of typical data sources.

Step 2: Determine Service-area MHI

The second step in developing the RI is to determine MHI for your service area (or general service area boundaries if the service area does not exactly follow Census-designated areas). In its 1997 Guidance, EPA recommends using the MHI from the latest census year and adjusting it to current year dollars using the average CPI inflation rate. However, the Decennial Census no longer includes MHI as a statistic. MHI is reported annually as part of the U.S. Census Bureau American Community Survey (ACS), which can be accessed via the American FactFinder (AFF) website at factfinder.

Table 2-1 Typical data sources for calculating EPA's Cost per Household

Component of CPH	Data source
Current annual WWT, CSO, or stormwater costs	Utility/municipality financial reports (in some states these are available from central records kept by the state auditor or other state offices)
Projected annual WWT, CSO, or stormwater costs	Utility/municipal planning documents
CPI	Bureau of Labor Statistics (USDOL BLS, 2012)
Percent of total wastewater flow attributable to residential users	Utility billing data
Number of households in service area	Utility/municipal planning documents, U.S. Census Bureau ACS single-year estimates for most recent year[a]

aU.S. Census Bureau ACS data can be used if service area boundaries follow Census divisions (e.g., county, city, Census tracts, metropolitan statistical areas). Chapter 5 provides additional detail on ACS data.

census.gov/faces/nav/jsf/pages/index.xhtml. Additional detail and instructions for accessing ACS data are included in chapter 5, as well as in Workbooks 2, 3, and 4 that are included with this Assessment Tool.

EPA's 1997 Guidance also states that if the service area includes more than one jurisdiction, a weighted MHI should be developed based on the number of households within each area. In addition, if MHI is unavailable for a specific service area or jurisdiction, EPA suggests that the surrounding county's MHI may be sufficient.

Step 3: Calculate and Analyze the RI

To calculate the RI, the annual CPH is divided by the MHI of the service area. The RI indicator is then compared to financial impact ranges established by EPA to determine whether unfunded mandates will produce a possible high, mid-range, or low financial impact on residential users. In the context of wastewater, CSO, and stormwater controls, the RI is categorized as low if it is less than 1%, mid-range if it is between 1% and 2%, and high if it is greater than 2%. For drinking water, an RI of greater than 2.5% is considered to represent a high financial impact.

In its 1997 Guidance, EPA suggests that if the wastewater RI is classified as "mid-range" or "high", then the community should perform a secondary screening analysis (i.e., calculate the FCI) to assess the utility's financial capability to afford additional programs. Results from the preliminary and secondary screening analyses are ultimately combined into EPA's Financial Capability Matrix to determine whether a community should be granted a longer compliance schedule for meeting regulatory obligations, or provided another form of relief.

Chapter 3

Primary Data Sources for Developing Alternative Measures of Household Affordability

This chapter provides an overview of the data sources that can be used to develop the metrics outlined in the subsequent chapters (4 and 5), including:

1. U.S. Census Bureau American Community Survey (ACS, the primary data source)

2. U.S. Census Bureau Integrated Public Use Microdata Series (IPUMS)

3. Additional national, state, and local sources.

Use these data sources to develop alternative measures of household affordability (i.e., beyond EPA's RI). Such alternative measures include a series of socioeconomic indicators, such as income distribution and poverty rates within a community, as well as specific affordability metrics for different household types.

Workbooks 2 and 3 provide more information and step-by-step instructions for accessing and analyzing this data.

U.S. Census Bureau ACS

The U.S. Census Bureau ACS serves as the primary source of data used to develop the affordability measures recommend in this Assessment Tool. The ACS is a household survey conducted by the U.S. Census Bureau with a current annual sample size of approximately 3.5 million households. The ACS replaced sample (long-form) data from the Census and is now the only source of data on income, poverty status, education, employment, and most housing characteristics. ACS estimates are released annually (for geographic areas with a population of 65,000 or more), as a three-year average (for geographic areas with a population of 20,000 or more), and as a five-year average (for all geographies, down to the Census Block Group level). The ACS is considered the most reliable source of detailed socioeconomic data currently available, and is the only source of data available for small geographies.

ACS datasets can be used to access socioeconomic data that will allow better examination of economic need within a community, including:

• Income levels and income distribution

• Poverty rates

• Unemployment rates

• Households receiving public assistance

• Some information on housing costs and housing burden

ACS data are also used in this Assessment Tool to develop specific affordability metrics, such as comparing average household water and wastewater bills to the MHI for each income quintile, and examining EPA's RI at the census tract level to identify potentially vulnerable communities.

ACS data are available on the U.S. Census Bureau's American FactFinder website. One-year estimates are typically released for the previous year every September, three-year estimates in October, and five-year estimates in December. As of December 1, 2012, the U.S. Census Bureau has released one-year estimates for 2011 and three-year estimates for 2009-2011. Five-year average estimates are scheduled for release on December 6, 2012.

Throughout this Assessment Tool, USCM, AWWA, and WEF recommend using the ACS to collect socioeconomic data at the city (or service area) level (i.e., using single-year or three-year average ACS estimates), as well as at smaller geographic scales (e.g., at the Census tract level, using five-year average ACS estimates). Analysis of these data on a smaller-scale (such as a Census tract or neighborhood) can help to identify vulnerable populations and assess potential EJ concerns.

Workbooks 2 and 3 provide additional information and step-by-step instructions for accessing, reporting, and mapping both one-year and five-year average ACS estimates. This includes guidance on navigating the AFF website, specific source tables for socioeconomic data, and selecting the correct geographic area (e.g., place within a state, county, metropolitan service area) for your service area.

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U.S. Census Bureau IPUMS

In addition to ACS data, more in-depth analyses can be performed using the U.S. Census Bureau's IPUMS. IPUMS can be used to analyze socioeconomic characteristics across different types of households (e.g., renter-occupied versus owner-occupied households, multi-family versus single-family) or to run queries or cross tabs at the city- or PUMA-level. PUMAs are statistical geographic areas that have been defined for the tabulation and dissemination of IPUMS data. PUMAs are made up of clusters of Census tracts and have a population of at least 100,000.

IPUMS consists of more than 50 high-precision samples of the American population drawn from 15 federal Censuses and 2000–2010 ACS data. IPUMS is composed of microdata, meaning that each record is a person. In most samples, persons are organized into households, making it possible to study the characteristics of people in the context of their families or other co-residents. Because IPUMS uses census results from individuals, it is possible to drill down into much deeper detail than possible with ACS summaries. For example, IPUMS data can be used to determine the percentage of people at certain income levels in different areas of a city or community (e.g., the percentage of residents with incomes greater than the 2% affordability threshold income).

The use of PUMS data presents several obstacles for water and wastewater utilities. Most importantly, because the data are individuals and not tables, researchers must use advanced statistical packages (such as SPSS, SAS, S-plus, or R software programs) to analyze the millions of records in the database. In addition, the large size of the PUMAs (100,000 people) is a potential problem for smaller cities. Further, because PUMAs must include 100,000 people, some PUMA boundaries are arbitrary and do not always follow political or common geographical delineations.

For these reasons, this Assessment Tool does not provide in-depth detail on how to access and analyze IPUMS data. However, the use of these data by water and wastewater

utilities may be performed in-house or by consultants with relevant knowledge. More information on IPUMS can be found at www.census.gov/acs/www/data_documentation/public_use_microdata_sample/.

Throughout the remainder of this Assessment Tool, places where IPUMS data would serve to augment household affordability assessments are noted; however, the Assessment Tool and analyses focus on more accessible and user-friendly data sources.

Supplemental Data Sources

In addition to U.S. Census Bureau surveys, state and local data sources can also provide a wealth of relevant information. The availability of these sources will vary across utilities/municipalities and may include information from states' labor departments (e.g., particularly for unemployment data), economic development and local government agencies, and other local agencies and organizations.

Another source of supplemental data may include datasets that provide information on nondiscretionary spending and housing costs within a city compared to the national average, or some other benchmark. This information can help to demonstrate the burden that these costs place on different types of households and can provide insight into the potential effects of water and wastewater rate increases. For example, in larger communities where the cost of living is high and incomes are commensurate with the national average, the American Chamber of Commerce Research Association (ACCRA) Cost of Living Index (COLI) database might serve as an important measure of existing household burdens. The ACCRA COLI database provides a measure of differences in the cost of living among urban areas in the United States relative to price levels for consumer goods and services in participating areas. Data from the BLS Consumer Expenditure Survey (CES) can also be used to assess economic burdens within different types of communities, including both urban and rural communities. More information on the ACCRA COLI is available at www.coli.org/.

Chapter 4

Guidance for Analyzing Socioeconomic Indicators of Household Affordability for Your Community

There is no single piece of information that can definitively indicate whether a community is at risk of being unable to afford increased water and wastewater costs. However, relevant socioeconomic indicators can help to provide a more complete picture of a community's economic and social characteristics (and thus, its ability to afford rate increases associated with unfunded mandates). This Assessment Tool (and associated templates) focuses on the following indicators of social and economic need[1]:

• Income levels

• Income distribution

• Poverty rates

• Household economic burdens and nondiscretionary spending

• Supplemental indicators, including households receiving public assistance and unemployment rates within a community.

The following sections provide an overview of the socio-economic indicators described above, as well as general guidance for accessing and analyzing specific socioeconomic data. We do not propose specific affordability thresholds for these indicators, rather, they are intended to provide context and to help "build the case" for why a community may merit additional consideration for regulatory relief.

Throughout this Assessment Tool, graphs and tables for specific indicators are presented, drawing upon data from various U.S. cities as examples. Workbook 2, "Assessing American Community Survey Data at the Community,

National, and Census-Tract Levels," includes step-by-step instructions for accessing the ACS data necessary for analyzing each indicator. Workbook 3 provides templates for developing specific analyses for your community[2].

Income Levels

Although not useful as a sole indicator of household afford-ability, MHI data will serve as an important component of your household affordability assessment. In addition to providing an indication of economic need, MHI data will be used to develop specific affordability measures (e.g., evaluating water and wastewater rates as a percentage of MHI by Census tract or within each income quintile).

The first order of business is to document MHI for your community for the most recent year available, compared to the national MHI for the same year (in 2011, the MHI in the United States was $50,502). Citywide or service area-wide income data are easily obtained via American FactFinder (AFF) using the ACS single-year, three-year average, or five-year average dataset, depending on the size of your community. See Workbooks 2 and 3 with this Assessment Tool.

To identify specific areas in your community with high concentrations of low-income households, MHI data should also be analyzed at the Census tract level. These data will be based on five-year average estimates from the ACS because single-year data are not available at this smaller geographic scale (5-year average estimates are available for all geographies). These data should be downloaded via AFF into Excel spreadsheets for further analysis.

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1 There are other indicators that localities and utilities may want to consider, particularly those listed in the EPA 1995 Interim Eco - nomic Guidance for Water Quality Standards Workbook as part of the widespread economic impact analysis; these indicators include: losses to local economy; increases in unemployment; impacts on property values or community development potential; decreases in tax revenues; loss of future jobs or personal income. See this EPA guidance for a complete list.

2 ACS estimates are released annually (for geographic areas with a population of 65,000 or more), as a three-year average (for geograph - ic areas with a population of 20,000 or more), and as a five-year average (for all geographies, down to the Census Block Group level).
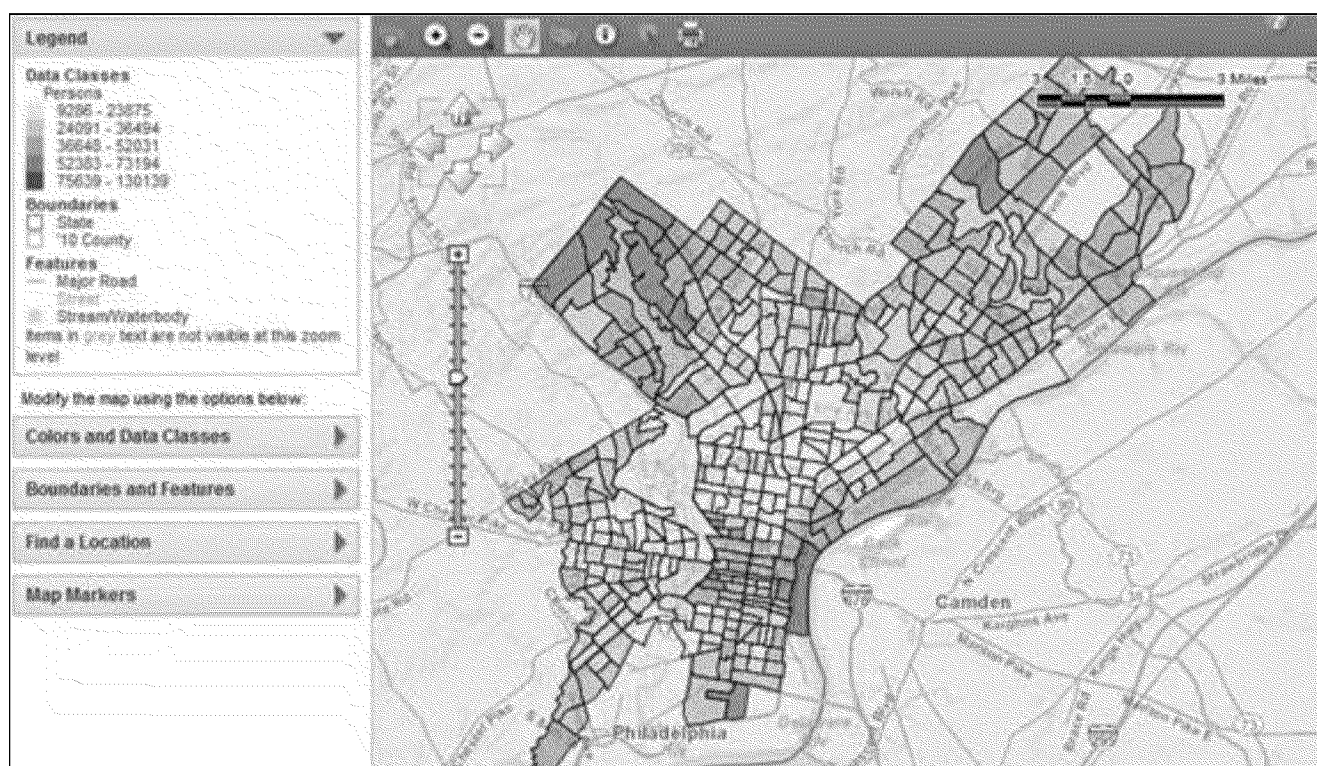
Figure 4-1 MHI by Census tract, 2011, developed using American Fact Finder website
Source: U.S. Census Bureau ACS, 2011a, 2006–2010 five-year average estimates

The AFF website provides options for developing maps of income and other socioeconomic data by Census tract. Tract-level data can also be analyzed and mapped using geographic information systems (GIS), depending on the resources and capabilities within your utility. With the use of GIS, utilities have the options for further analyzing the data and conducting more in-depth analyses (e.g., developing maps showing Census tracts where the average household water and wastewater costs exceed specific percentages of MHI). Workbook 3, "Socioeconomic Indicators" provides specific instructions for accessing Census tract-level data and developing the corresponding maps.

Figures 4-1 and 4-2 provide examples of Census tract MHI maps for the City of Philadelphia developed on the AFF website and using GIS, respectively. These maps demonstrate significant variation across census tracts, in terms of MHI. Workbook 2 includes specific instructions for downloading and mapping Census tract level data.

To identify potentially vulnerable populations, income levels should also be analyzed across different types of households. For example, in some communities there may be considerable differences between income levels for renter-occupied and owner-occupied households, as well as between multi-family and single-family households, or between elderly and non-elderly households. Income data for renter and owner-occupied households and for elderly residents can be downloaded from the 2011 (or relevant year) ACS single-year dataset. However, income data for multi-family and single-family households can only be accessed through IPUMS.

Table 4-1 shows how MHI can vary significantly across different types of households, using Kansas City, Kansas as an example.

In addition, in recent years income levels in many cities have been declining. Where this happens it has important affordability implications because it means that increases in water and wastewater bills will not be offset by similar increases in incomes. Income data can be downloaded from single-year ACS databases from 2005 through the current year. When comparing MHI across years, it is important to adjust for inflation (using the CPI) so that all data points are compared using the same year value. For smaller communities, it will be necessary to look at changes in three-year or five-year average ACS estimates.

Continuing with Kansas City as an example, Figure 4-3 presents a graph of citywide MHI for 2005 through 2011. As shown, Kansas City has followed the trend of many cities in the United States, with real MHI declining by about $1,150 from 2005 to 2011. When compared to average increasing annual household water and wastewater costs, this graph can serve as a useful tool to show how increasing water and wastewater bills are outpacing real increases in household
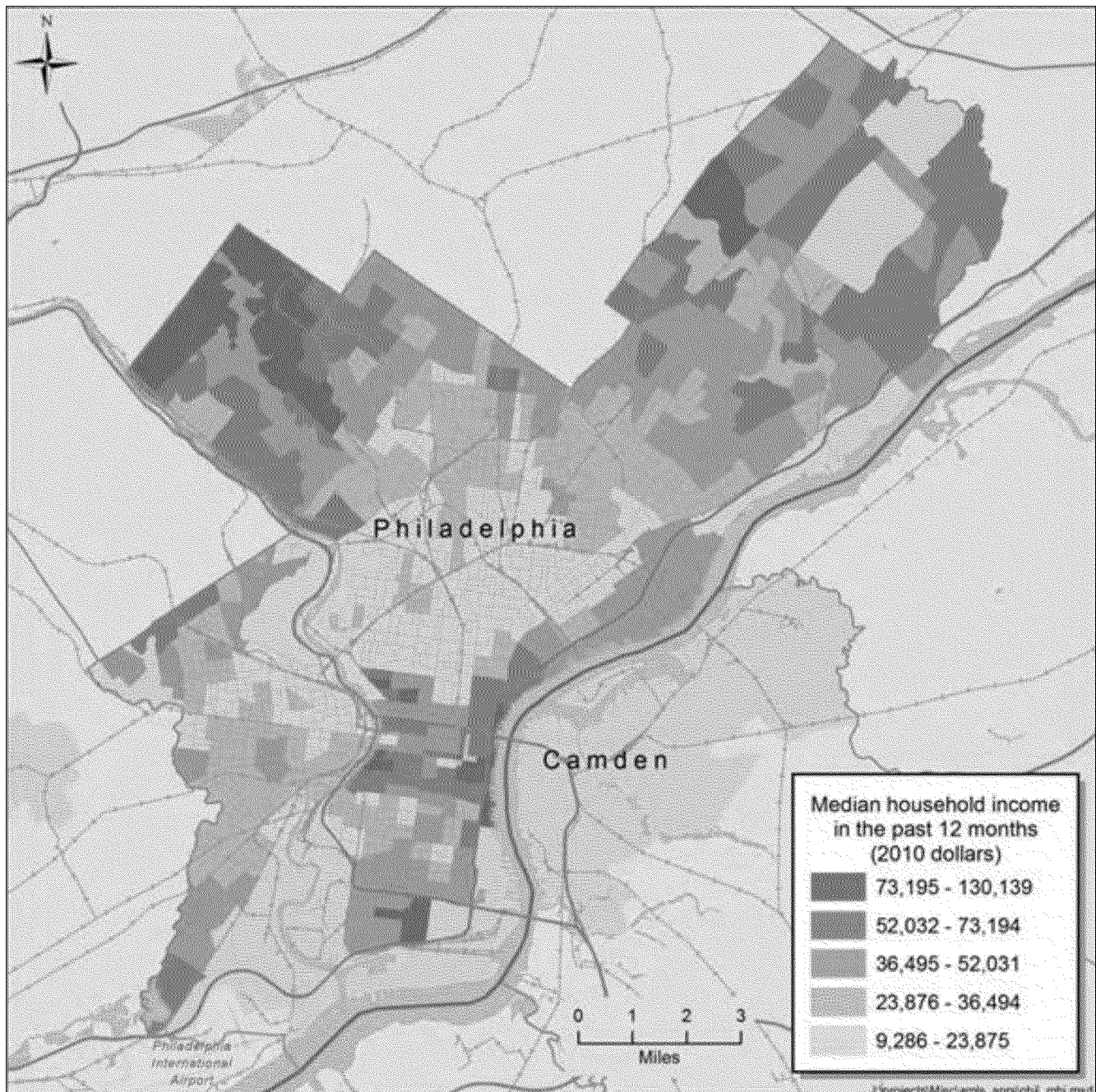
Figure 4-2 MHI by Census tract, 2011, developed using in-house GIS capabilities
Source: U.S. Census Bureau ACS, 2011a, 2006–2010 five-year average estimates

incomes (e.g., annual average household water and waste-water costs can be graphed on the secondary y axis).

Table 4-1 MHI by household type, Kansas City, Kansas

Household type	MHI (2011$)
All households	37,036
Elderly households	27,955
Renter-occupied	24,898
Owner-occupied	47,272

Source: U.S. Census Bureau ACS, 2012, 2011 single-year estimates

Workbook 3 (an Excel spreadsheet) provides the specific ACS data tables you will need to obtain the information presented above for your community. The spreadsheet also provides templates for presenting these indicators as graphs and tables (see spreadsheet tabs MHI, MHI_HHType, and ServiceArea_MHI_2005-2011).

Income Distribution

In many cities, incomes are less centered on the median compared to incomes in the United States as a whole. This has important implications for affordability because
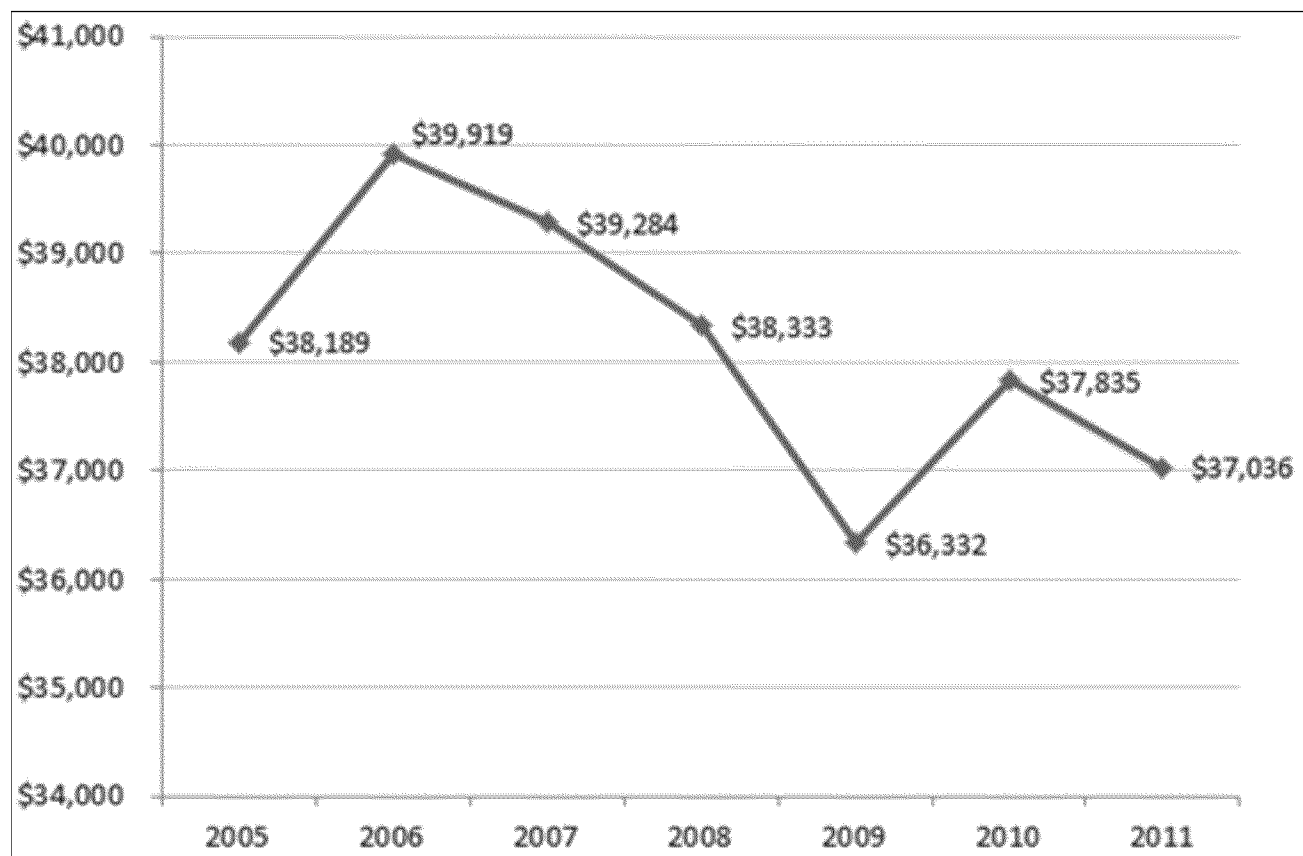
Figure 4-3 Kansas City MHI, 2005–2011, adjusted to 2011 dollars using CPI
Sources: U.S. Census Bureau ACS, 2006, 2007, 2008, 2009, 2010, 2011b, 2012 (2006-2010 single-year estimates).

it means that a higher percentage of households within these communities may be adversely impacted by water and wastewater rate increases compared to what might be expected under a more equal distribution of income. Although this is the case in many larger urban communities, Rubin (2001b) shows that this is also the case for many rural/nonmetropolitan communities, which tend to have a higher percentage of households in lower-income categories compared to the national average.

Income distribution can be examined with ACS data in different ways, including by income quintile, as well as by 10- and 16-category distributions. Table 4-2 shows the upper limits of household income quintiles for Atlanta, Georgia, compared to the United States as a whole. As shown, the lowest-income quintiles in Atlanta are substantially lower than those for the United States. This indicates that a greater percentage of Atlanta households are at the lower end of the income spectrum compared to the national average (e.g., the upper limits for the lowest quintile

indicate that in the United States, the lowest 20% of households earn less than $20,585 per year, while in Atlanta, the lowest 20% of households earn less than $12,294 per year). Conversely, the lower limits for the upper quintiles are greater in Atlanta than for the United States overall.

Table 4-2 Household income quintile upper limits, Atlanta, Georgia and the United States (2011$)

	Atlanta, GA	United States
Lowest quintile	12,294	20,585
Second quintile	31,873	39,466
Third quintile	59,043	63,001
Fourth quintile	104,233	101,685
Lower limit of top 5%	246,335	187,087

Source: U.S. Census Bureau ACS, 2012.
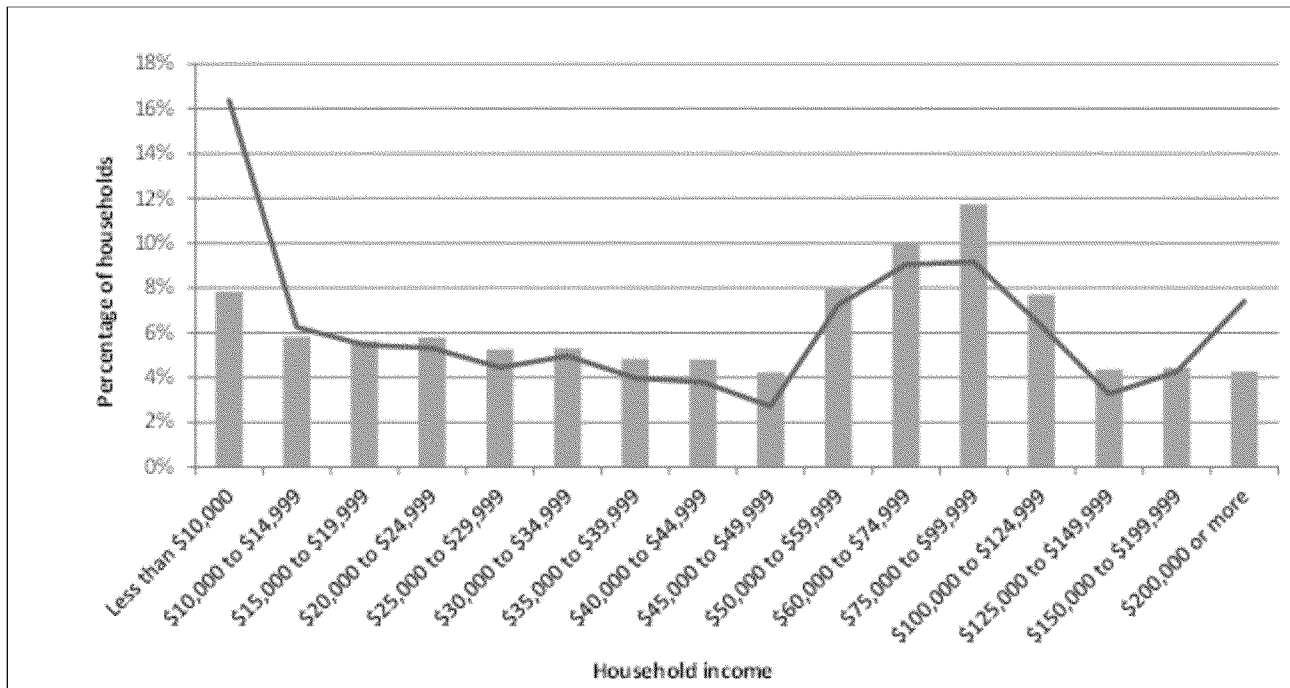
Figure 4-4 Income distribution in Atlanta, Georgia and the United States
Source: U.S. Census Bureau ACS, 2012 (2011 single-year estimates).

Figure 4-4 graphically portrays that the income levels in Atlanta are more concentrated toward the ends of the income spectrum compared to the national average. Indeed, the figure reveals that the income bracket containing Atlanta's MHI ($43,903 in 2011) is one of the least-populated income classes in the entire city. Thus, it is evident that in Atlanta (and in many other cities in the United States), citywide MHI does not reflect a "typical" household. Further, a much higher percentage of residents would be adversely impacted by increased water and wastewater bills compared to communities with a more equal and centrally clustered income distribution.

The evaluation of income distribution across different household types can help to identify vulnerable populations within a community. Continuing with Atlanta, Georgia, as an example, Figure 4-5 shows the income distribution across elderly households (i.e., the head of the household is 65 years or older) compared to the income distribution citywide. As shown, the majority of elderly households

(52%) have a reported income of less than $25,000. This compares to about 33% of households citywide.

As demonstrated in Table 4-1, a second population of potentially vulnerable households includes renter-occupied households, which often have lower incomes than owner-occupied households. Figure 4-6 shows the income distribution for renter- and owner-occupied households in Atlanta, Georgia, where 55% of all households are renter occupied. As shown, there is a much higher percentage of renter-occupied households in the lower-income categories, with close to 40% of all renters earning less than $20,000 per year.

Workbook 3 provides the specific ACS data tables that you will need to obtain income distribution data for your community. The spreadsheet also provides templates for presenting these indicators as graphs and tables (see spreadsheet tabs Inc._quintiles; Inc._dist; Elderly_Inc_dist;, and Renter_Owner_Inc_dist).
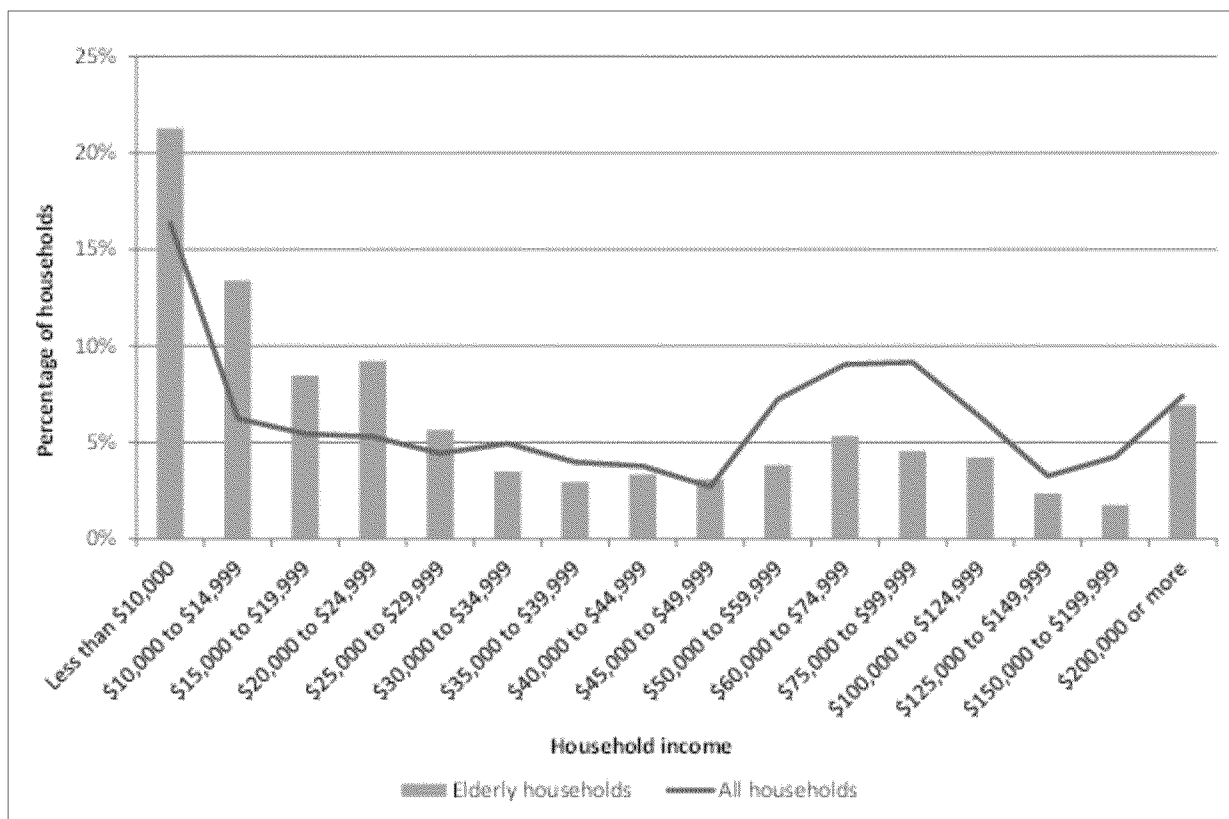
Figure 4-5 Income distribution in Atlanta, Georgia, elderly households and citywide
Source: U.S. Census Bureau ACS, 2012 (2011 single-year estimates)
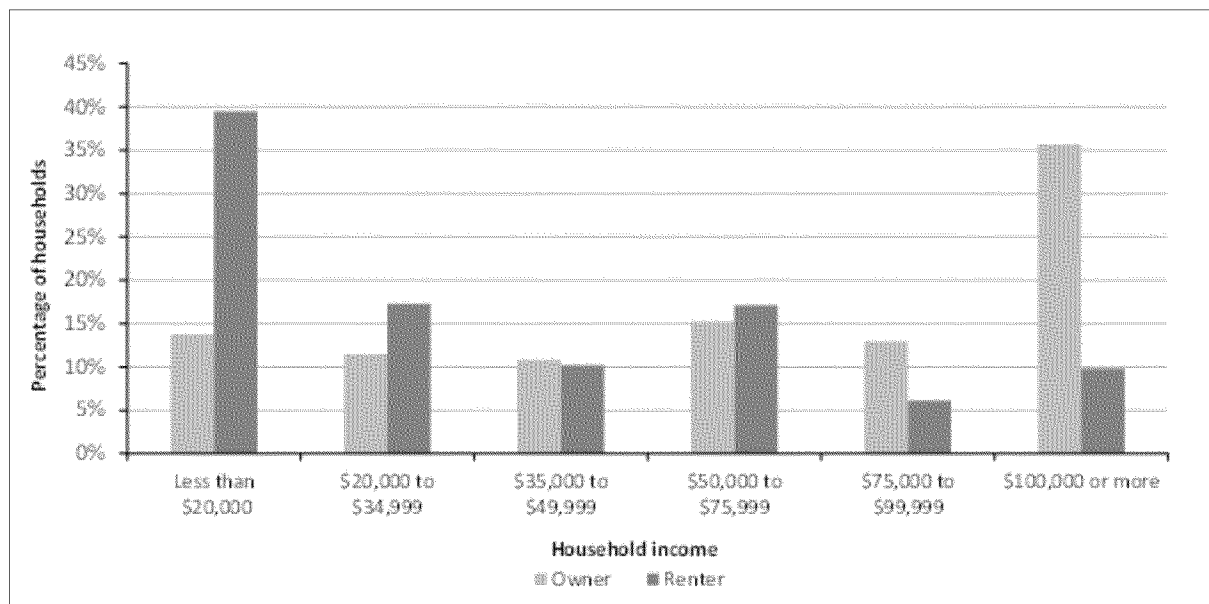
Figure 4-6 Atlanta, Georgia income distribution, renter- and owner-occupied households
Source: U.S. Census Bureau ACS, 2012 (2011 single-year estimates)

Poverty Rates

In addition to income levels and income distribution, poverty rates serve as an important indicator of economic need. In 2011, 15.9% of people in the United States were living below the federal poverty line. This percentage provides a benchmark for assessing poverty levels within your community, which can be obtained using ACS single-year and three-year average estimates (depending on the size of your service area). Data on the percentage of elderly residents and children living below the federal poverty line are also available through ACS. These data can help to identify vulnerable populations.

Similar to income levels, poverty rates can be examined at the Census tract level using five-year average ACS estimates. Once these data are downloaded, they can be used to identify "poverty areas," where 20% or more of the households in that Census tract have incomes below the federal poverty level. Again, these data can be mapped using AFF or with GIS capabilities at your utility.

In terms of affordability, identifying areas where poverty is more concentrated may have important implications for public health. In essence, the effective reduction in disposable income among low-income households could adversely affect those households' ability to pay for needed food, heat, and medical care (Crawford-Brown et al., 2009; Raucher et al., 2011). Care should be taken to ensure that public policies (including well-intentioned environmental mandates) do not impose costs that may further exacerbate the health challenges faced by households in such low-income neighborhoods.

Many have argued that the official (i.e., federal) poverty rate does not provide an accurate measure of the number of households truly living in poverty conditions. Indeed, various studies have emphasized that households with incomes that are significantly higher than the poverty level often experience severe hardships, including hunger, lack of needed heating and cooling, and the inability to afford medical care (Boushey et al., 2001).

To obtain a more accurate measure of households living in poverty conditions, the U.S. Census Bureau developed a Supplemental Poverty Measure (SPM) in 2010. The SPM factors in public assistance and financial support offered to low-income households (e.g., housing subsidies, low-income home energy assistance) and also recognizes some nondiscretionary expenses that such households bear (e.g., taxes, out-of-pocket medical expenses, and geographic adjustments for differences in housing costs) (U.S. Census Bureau, 2011a).

At the national level, for a two-adult, two-child household in 2010, the SPM income threshold was set at $24,343. This compares to the official poverty threshold of $22,113. Nationwide, the SPM indicates[4] that there are 5.35% more people in poverty than the official poverty threshold would indicate. The SPM also indicates that inside Metropolitan Statistical Areas the difference is 11.2%, and within "principal cities," the SPM-implied number of people in poverty is 5.94% higher than the official poverty measure indicates. Although the SPM is not yet available at the city/community level, these general rules can help to identify additional households that may be adversely impacted by increased water and wastewater rates.

Workbook 3 provides the specific ACS data table that you will need to obtain poverty data for your community. The spreadsheet also provides templates for presenting these indicators as graphs and tables (see spreadsheet tab "Poverty").

Housing Burdens and Nondiscretionary Spending

As noted in chapter 1, EPA's residential indicator does not capture existing household economic burdens beyond those associated with water and wastewater bills. Economic burdens are commonly measured by comparing the cost of particular necessities to the resources (e.g., income) available to a household or community. EPA's RI is such a measure in that it is used to evaluate the economic burden from wastewater charges by comparing those charges to MHI. However, wastewater service is just one of a set of basic necessities whose costs influence the overall economic burden on a community's households.

Household economic burdens can be a significant factor for large urban communities where the cost of living is much higher than the national average, as well as in smaller rural communities where MHIs are often lower than the national MHI but nondiscretionary costs are not. Analysis of household economic burdens and nondiscretionary spending requirements can provide an indication of how difficult it is for both low- and middle-income households in your community to make ends meet, and how increases in water and wastewater costs will impact different types of households.

Housing burden is the most common measure of household economic burden. Most government agencies consider housing costs of between 30% and 50% of household income to be a moderate burden in terms of affordability, while costs greater than 50% of household income are considered

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4 The SPM also adjusts for different housing status (e.g., renters versus owners). Additional details can be found in the U.S. Census Bureau (2011).

a severe burden. The ACS provides information on monthly housing costs for both owner-occupied and renter-occupied households, as well as by income level. These data can be divided by the MHI for these different groups to calculate housing burden. Additional analyses can be performed using IPUMS data (e.g., IPUMS can be used to determine the exact number of households with a moderate or severe housing burden, while ACS summary files can only provide average costs as a percentage of MHI for a limited number of household types).

Workbook 3 provides the specific ACS data tables you will need to access to obtain housing burden data for your community. The spreadsheet also provides templates for presenting different housing burden indicators as graphs and tables (see spreadsheet tab "Housing_burden").

Sources of nondiscretionary spending data can help to provide insight into additional household economic burdens. Key sources for these data include the Bureau of Labor Statistics CES, the ACCRA COLI, and any additional local data sources prepared by government agencies or organizations. The BLS CES contains detailed demographic, income, and monthly expenditure data at the PUMA level. These data can provide insight on relative consumer spending within your community compared to different types of communities (e.g., urban vs. rural). CES data are accessed in the same way that IPUMS data are accessed, and require a thorough knowledge of a statistical software package such as SAS, SPSS, or STATA.

ACCRA COLI data are another source of nondiscretionary spending data. The ACCRA COLI provides a measure of differences in the cost of living among urban areas in the United States. The ACCRA COLI measures relative price levels for consumer goods and services in participating areas. The average for all participating places, both metropolitan and nonmetropolitan, equals 100 and each participant's index is read as a percentage of this average. The ACCRA COLI dataset is updated quarterly for approximately 305 cities within the United States, and includes data for different income quintiles. This data can be useful if your community is one of the participating areas.

Additional Socioeconomic Indicators

There are several additional measures of economic need that can help to examine the ability of households to afford water and wastewater rate increases, including:

1. Percentage of residents receiving public assistance income and/or food stamps

2. Average annual unemployment rates

3. Number/percentage of households that are delinquent in paying their water bills

4. Number/percentage of households enrolled in utility low-income assistance programs.

Workbook 2 describes the specific ACS source tables that contain information related to the percentage of residents receiving public assistance income and/or food stamps and average annual unemployment. Information on delinquency rates and low-income assistance programs should be available through your utility.

Chapter 5

Guidance for Developing Alternative Measures of Household Affordability

This chapter provides additional guidance for assessing water and wastewater affordability at the household level (i.e., going beyond EPA's RI). This includes the development of utility-specific affordability measures, such as comparing current average wastewater bills to household income levels across the income distribution in your service area or community. The following sections provide an overview of recommended approaches for assessing affordability and communicating results, while more detailed instructions and templates for developing these alternative metrics are included in Workbook 4.

Remember that EPA may consider the affordability of water and CSO mandates using your community's MHI. However, throughout the following sections, water and/or wastewater bills are compared to household income levels, drawing upon data from selected communities throughout the United States. For the purpose of this Assessment Tool, hypothetical average household water and wastewater costs of $300 and $450, respectively, are used for a combined average annual bill of $750. It is important to keep in mind that these analyses can be conducted using current water and/or wastewater costs, as well as household water and wastewater costs that take into account planned rate increases. This chapter also provides additional detail on conducting affordability analyses for future years.

Average Water and Wastewater Bills

Throughout this chapter, the comparison of average household water and wastewater bills to household income levels are discussed. It is important to note that the use of the term "bill" is intended to reflect the estimated average costs of water and/or wastewater service based on current rates and average household consumption. If data are available, a weighted average can be determined based on the number of single- and multi-family homes in the community and their respective average household consumption levels.

With this approach, average household water and wastewater costs are based on your utility's existing rate models, as reflected in the current rates. This provides a more realis-

tic assessment of current household costs and should allow you to easily evaluate household affordability in future years under planned rate increases. This approach should also allow you to examine household affordability under a series of "what if" scenarios (e.g., examining affordability with and without the impact of a potential mandated or nonmandated investment, or under different assumptions regarding interest rates and financing costs).

Water and Wastewater Bills and Household Income Comparisons

As a first step to developing your affordability indicators, compare average annual water and wastewater bills to household incomes for different types of households and across geographic areas. At the citywide level, this calculation essentially represents EPA's RI (although it can include water costs in addition to wastewater costs). The RI calculation should also be evaluated at the Census tract level (if your community is large enough to include several Census tracts) to identify areas where average household costs may have a "mid-range" to "large" economic impact (e.g., as defined by EPA for wastewater).

Continuing with our analysis of MHI by Census tract for the City of Philadelphia (see chapter 4), Figure 5-1 shows average annual household wastewater costs (using our hypothetical average bill of $450) as a percentage of Census tract MHI. This map demonstrates how an increase in wastewater rates would impact communities within Philadelphia differently.

The Census tracts outlined in black in Figure 5-1 illustrate an important point for analyzing household affordability at the Census tract level. These Census tracts are highlighted because they have fewer than 750 people in them (the average number of people per Census tract is about 4,000). Thus, although a map may show several Census tracts where the average household water and/or wastewater bill amounts to a relatively high percentage of MHI, it is important to evaluate what this means in terms of the overall population of your service area (in the case of Philadelphia, about 1.5 million people). To account for this,

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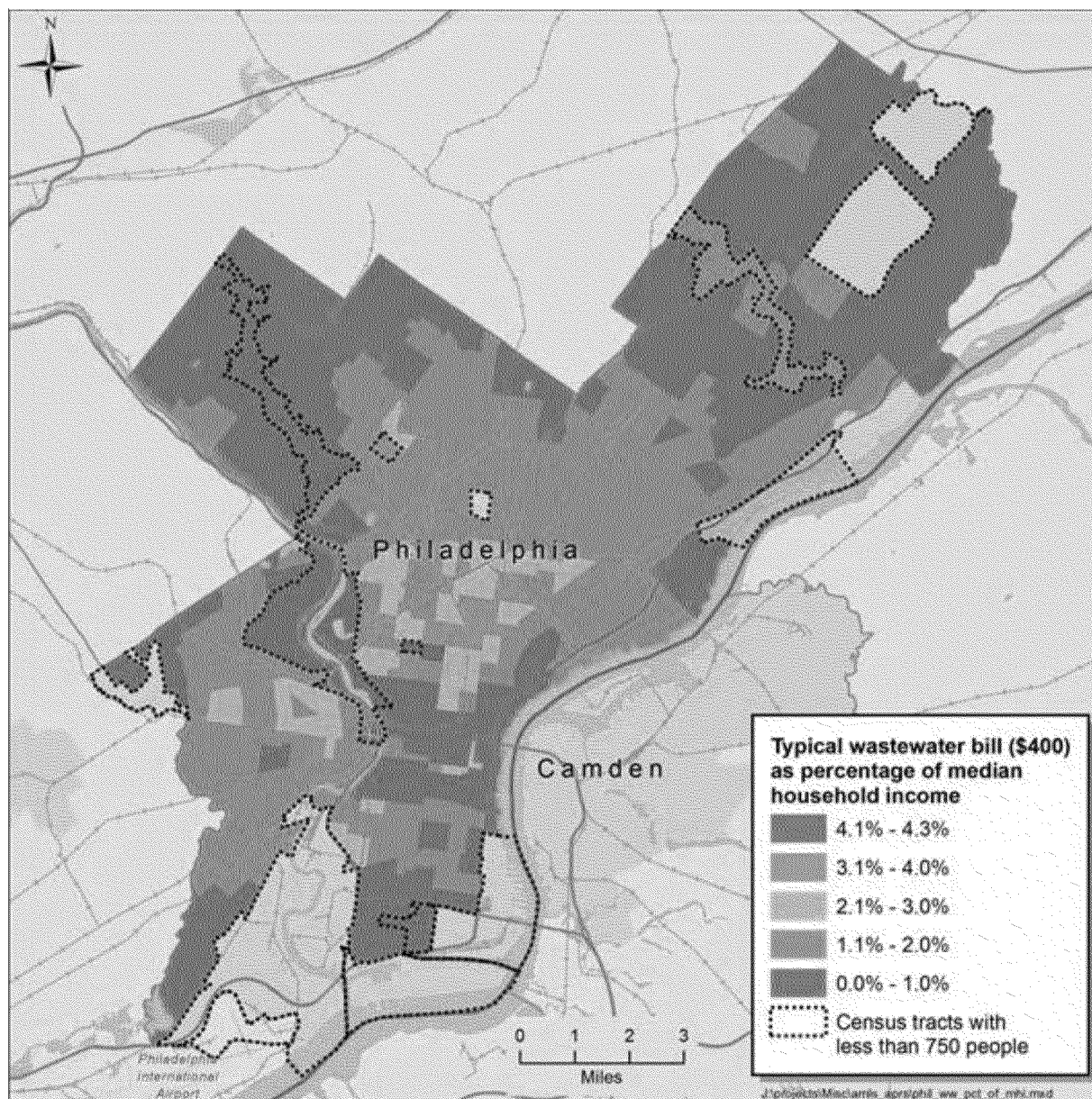
Figure 5-1 Hypothetical average annual wastewater bill as a percentage of Census tract MHI, Philadelphia, Pennsylvania
Source: U.S. Census Bureau ACS, 2011a, 2005–2010 five-year average estimates

it is important to examine variables that provide context (e.g., population, number of households) when downloading Census tract data for specific analyses. These data can be easily downloaded by Census tract via AFF using ACS five-year average estimates.

In many communities, the estimated average household wastewater bill and total combined (water and wastewater) bill may not exceed 2% and 4.5%, respectively, of MHI in most Census tracts; however, a number of households have incomes well below the MHI for their community. Many of these households may already be paying more than 2% of their income for wastewater services, or more than 4.5% of their income for combined water and wastewater services.

This can be easily examined using income distribution data from the ACS. For example, Figure 5-2 shows the percentage of households within Sacramento, California, at different levels of affordability (i.e., the percentage of households spending certain percentages of their income
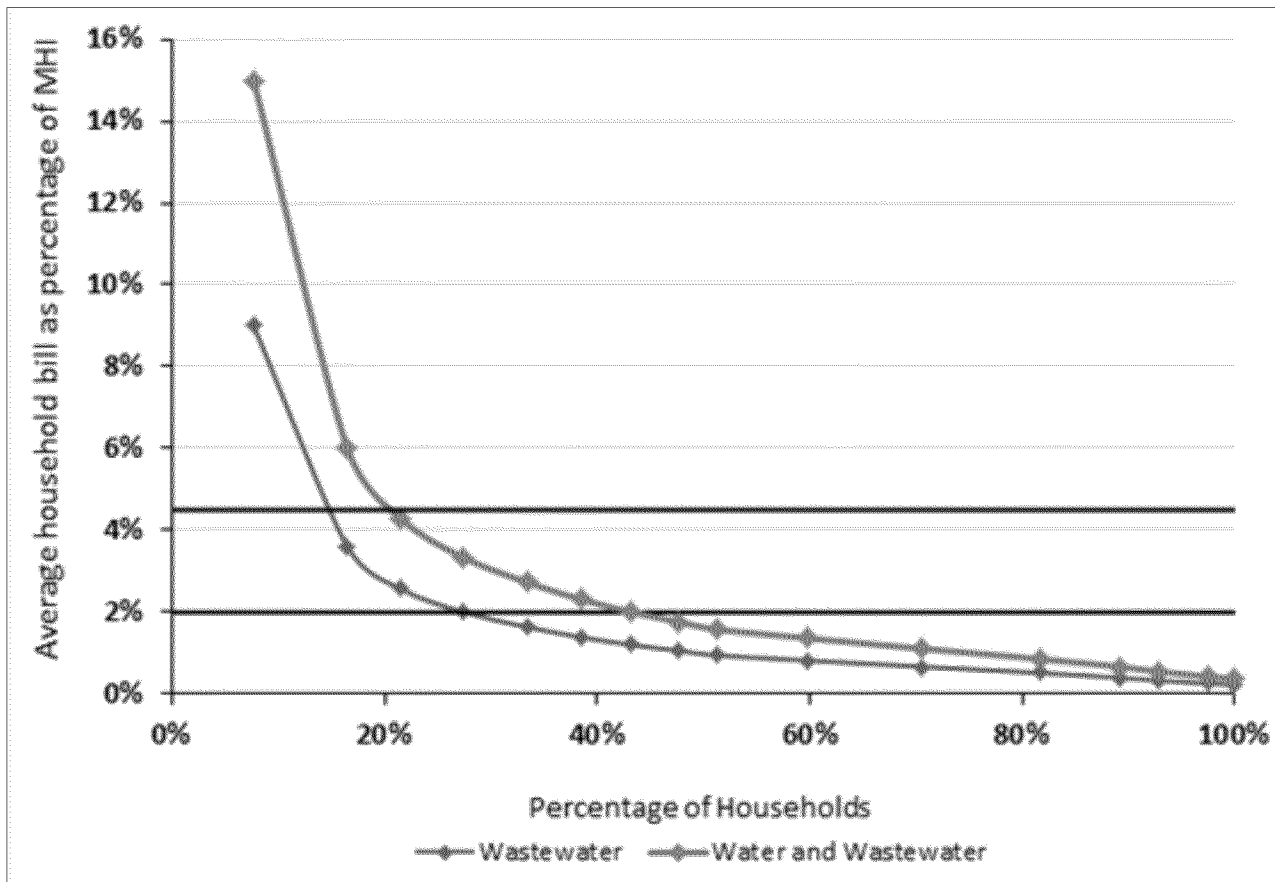
Figure 5-2 Hypothetical annual average wastewater and combined water and wastewater bills as a percentage of household income, Sacramento, California

on water and wastewater services). This analysis is based on the percentage of households within each of 16 Census-defined income categories and evaluates the average wastewater and total combined water and wastewater bill as a percentage of the mid-point income within each category. As shown, it appears that with average household costs of $300 and $450 for water and wastewater services, respectively, close to 30% of households in Sacramento, would pay more than 2% of their income for wastewater services, and about 20% pay more than 4.5% of their income for combined water and wastewater services.

IPUMS data can be used to conduct further analysis on the number of households that may be unable to afford significant water and/or wastewater rate increases. For example, based on the estimated average household water and wastewater cost of $750, households earning less than $16,667 would pay more than 4.5% of their income for water and wastewater services. IPUMS can be queried to determine the exact number of households within your community (and within each PUMA in your community), that make less than this amount (and therefore would have paid more than 2% of their income for their estimated average wastewater bill).

Table 5-1 Hypothetical annual average wastewater bill as percentage of MHI by income category, Butte, Montana

Income category	Percentage of households	MHI within income quintile	Average estimated wastewater bill as a percentage of MHI
Less than $20,000	24%	$10,000	7.50%
$20,000 to $39,999	26%	$29,999	2.50%
$40,000 to $74,999	30%	$57,499	1.30%
$75,000 to $99,999	8%	$87,499	0.86%
$100,000 to $199,999	10%	$149,999	0.50%

Three-year average ACS estimates were used due to the small size of Butte; one-year estimates are unavailable.

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Table 5-2 Hypothetical annual average wastewater bill as a percentage of federal poverty threshold incomes

Household or family size	Poverty threshold	Average water and wastewater bill (example) ($)	Estimated average household bill as a percentage of poverty level income (%)
1	$11,170	284	2.54%
2	$15,130	568	3.76%
3	$19,090	852	4.46%
4	$23,050	1,136	4.93%
5	$27,010	1,420	5.26%
6	$30,970	1,705	5.50%
7	$34,930	1,989	5.69%
8	$38,890	2,273	5.84%

Table 5-1 presents another way to evaluate impacts to low-income households within your community. Based on the hypothetical average water and wastewater bill of $750, Table 5-1 shows average annual water and wastewater costs as a percentage of MHI for different income categories, using Butte, Montana, as an example. As shown, average water and wastewater bills already amount to more than 7.5% of MHI for households in the lowest-income category (approximately 24% of the 14,836 households in Butte). This analysis assumes that MHI within each income quintile is the mid-point. However, IPUMS data can be used to determine the true median.

Examining the average wastewater bill as a percentage of poverty level income also provides insight into the number of people facing unaffordable water and wastewater bills. Poverty threshold incomes vary depending on the number of people living in the household. For example, in 2010, the official federal poverty threshold for a household or family of 2 was $15,130; for a family of 4, the poverty threshold was $23,050.

Table 5-2 shows the hypothetical average water and wastewater bill of $750 as a percentage of poverty threshold incomes by household size. To conduct this analysis, the combined water and wastewater bill of $750 were adjusted to account for differences in household size, based on the average U.S. household size of 2.64 in 2011 (i.e., each person in the household adds about $284 to the average bill). As shown in Table 5-2, the hypothetical average bill of $750 ranges from 2.5% to 5.8% of poverty threshold incomes.

Finally, as discussed in chapter 4, in many communities, incomes vary considerably between renter-occupied and owner-occupied households, as well as for elderly households. Drawing upon our analysis of MHI for different types of households in Kansas City, Kansas (see chapter 4), Table 5-3 shows an average total water and wastewater bill of $750 as a percentage of MHI across these different household types. As shown, in Kansas City renter-occupied households have much lower incomes than all other household types. On average, these households would pay 3.01% of their income for water and wastewater services with an average annual bill of $750.

Table 5-3 Hypothetical annual average total household water and wastewater bill as a percentage of MHI by household type, Kansas City, Kansas

Household type	MHI (2011$)	Average household water and wastewater cost as a percentage of MHI
All households	37,036	2.03%
Elderly households	27,955	2.68%
Renter-occupied	24,898	3.01%
Owner-occupied	47,272	1.59%

Source: U.S. Census Bureau ACS, 2012 (2011 single-year estimates).

IPUMS data can also be used to estimate average house-hold water and wastewater costs as a percentage of MHI for multi-family and single-family homes. For this analysis, the average estimated water and wastewater bill can be based on actual average consumption for these different types of households.

Workbook 4 provides specific instructions and templates for developing the affordability metrics (including graphs and tables) presented in this section. The "Overview" tab is this spreadsheet contains a table of contents that links spread-sheets in the Excel worksheet to specific figures and tables in this section.

Income Distribution: Implications for Wastewater Affordability

As noted throughout this report, EPA's 1997 Guidance suggests that wastewater bills equal to 2% of MHI are considered affordable for a community. In 1997 (when the Guidance was developed), the most recent income and poverty data available would have been from 1996. In 1996, the national MHI was $35,492 (U.S. Census Bureau, 1997). Thus, an average annual wastewater bill equal to 2% of na-tional MHI would have equated to $710. Based on national income distribution data, in 1996 the lowest quintile (20th percentile) of household income was 42% of the median income, or approximately $14,900 (U.S. Census Bureau, 1997). That is, the lowest 20% of households in the United States made $14,900 or less. At that income level, a bill of $710 would have equated to 4.75% of household income. In other words, the MHI threshold of 2% would be equivalent to having 20% of households in a community pay 4.75% (or more) of their income for wastewater service.

Using the national income distribution data for 2012, a bill equal to 2% of national MHI would be $1,010 per year. That bill would represent 4.9% (or more) of income for the lowest 20% of U.S. households, which is relatively similar to the 1996 level. In many communities, however, a wastewater bill of 2% of MHI would have a much more severe impact on low-income households. For example, in New York City, 2% of the city's MHI of $49,461 would be $989 per year. This would represent 5.9% at the upper limit of the city's lowest income quintile ($16,824), meaning that at least one-fifth of the city's households would be paying 5.9% of their income (or more) for wastewater services—a burden that is 20% greater than would be expected from the national income distribution.

In this example for New York City, in order to keep the impact on low-income households consistent with that expected from national income distributions—that is, to ensure that no more than 20% of households face sewer bills of 4.8% (or more) of income—then wastewater bills would need to be no more than $807 per year, or 4.8% of the upper limit for the lowest income quintile. This amounts to 1.63% of the city's MHI. This reveals the extent to which the 2% of MHI metric does not reflect burdens on the poorest 20% of households in the community, and that an MHI-based metric of affordability for New York City of about 1.6 would be more equivalent to 1996 measures for reflecting impacts on the lowest-income quintile.

This analysis can be easily applied to your community in the context of water and/or wastewater services using ACS data related to income quintiles and MHI.

Assessment of Affordability in Future Years

Finally, in addition to analyzing affordability impacts associated with current water and wastewater rates, it is also important to examine how affordability will change over time. Many utilities have the capability to estimate rate increases for future years, based on estimated costs associated with planned projects and programs. Using these data, it is relatively straightforward to calculate the estimated average household water and wastewater bill for future years. However, this calculation will need to take into account any assumed changes in household water consumption over time, such as whether your utility expects average household use to decline. You may also want to conduct sensitivity analyses to examine the effect of your assumptions (e.g., regarding O&M costs for planned projects or project financing costs and interest rates).

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In order to compare average water and wastewater bills to household income levels, it will also be necessary to make some assumptions about how income levels will change over time. In the past, we would have recommended that you simply assume incomes will increase at the same rate as the CPI. However, as demonstrated in chapter 6, in recent years income levels have not kept pace with the CPI, and have even declined in many communities. This can make it difficult to project MHI for your community going forward.

One approach for projecting future income levels is to examine how income levels have changed in recent years in comparison to the CPI. For example, over the past five years national income levels have increased at a rate of approximately 60% of the increase in CPI. Given the recent economic crisis and recovery process, it seems reasonable to assume that this trend will likely continue, at least for the near future. Thus, to project MHI over the next several years, you may wish to assume that incomes will increase by about 60% (or rate at which your community's MHI has increased relative to CPI) of the forecasted change in CPI (as developed by the Congressional Budget Office). Beyond the next several years, it may be reasonable to assume that incomes will again begin to increase at the same rate as the CPI. Although this analysis is not exact, it does provide a general idea of how income levels may change.

Communicating the Results

Given the wealth of information and analyses described in chapters 4 and 5 of this Assessment Tool, it can be difficult to imagine how to best synthesize and communicate the results of your affordability assessment. As noted in chapter 4, we do not propose any specific thresholds that would indicate that a community is at risk of being unable to afford significant increases in water and wastewater costs. The analyses conducted here are intended to go beyond EPA's RI to provide a more comprehensive assessment of household affordability.

Depending on your community, you may want to focus on specific aspects of the Assessment Tool suggested (e.g., EJ concerns, elderly households, impacts to low-income households). The graphs and tables portrayed in this Assessment Tool are also provided as templates in the guidance documents and can be used to analyze and present results.

Chapter 6

Guidance for Assessing Utility Financial Capability: EPA's Secondary Screening Analysis and Alternative Measures

This chapter provides guidance for completing EPA's secondary screening analysis (i.e., developing the FCI), as well as for developing alternative measures of utility financial capability. First, we overview the methods outlined in EPA's 1997 Guidance for completing the secondary screening analysis. Next, we provide guidance for developing alternative financial indicators (such as those outlined in chapter 4). More specific instructions and templates are included in Workbook 5.

Again, it is important to note that although EPA's 1997 Guidance was developed within the context of wastewater and CSO controls, our Assessment Tool is focused on the affordability of water supply, wastewater, CSO, and stormwater) programs.

Calculating EPA's FCI Metrics

EPA's secondary screening analysis includes a series of economic indicators used to evaluate a utility's financial capability to implement mandated wastewater, CSO, and/or stormwater controls. These indicators include:

• Bond rating

• Overall net debt as a percentage of full market property value (FMPV)

• Unemployment rate

• MHI

• Property tax revenues as a percentage of FMPV

• Property tax revenue collection rate.

Table 6-1 Permittee FCI benchmarks and their ratings: EPA Guidance

Financial capability metric	Strong (score = 3)	Mid-range (score = 2)	Weak (score = 1)
Debt indicators			
Bond rating GO bonds	AAA-A (S&P) Aaa-A (Moody's)	BBB (S&P) Baa (Moody's)	BB-D (S&P) Ba-C (Moody's)
Bond rating (revenue bonds)	AAA-A (S&P) Aaa-A (Moody's)	BBB (S&P) Baa (Moody's)	BB-D (S&P) Ba-C (Moody's)
Overall net debt as percentage of FMPV	Below 2%	2–5%	Above 5%
Socioeconomic indicators			
Unemployment rate	More than 1 percentage point below the national average	+/- 1 percentage average point of national average	More than 1 percentage of national average
MHI	More than 25% above adjusted national MHI	+/- 25% of adjusted national MHI	More than 25% below adjusted national MHI
Financial management indicators			
Property tax revenues as percentage of FMPV	Below 2%	2–4%	Above 4%
Property tax revenue collection rate	Above 98%	94–98%	Below 94%
GO: general obligation.			
S&P: Standard & Poor's.			

As part of the screening analysis, each indicator is "scored" on a scale of 1 (weak) to 3 (strong). The average of these scores represents the overall FCI. The following sections describe the methods and data sources used to determine each indicator. Table 6-1 shows the ratings and scores for each indicator, as outlined in EPA's guidance documents.

Bond rating

The first financial benchmark included in EPA's secondary screening analysis is a municipality's bond rating for both GO and revenue bonds. GO bonds are bonds issued by a local government and repaid with taxes (usually property taxes). GO bond ratings reflect financial and socioeconomic conditions experienced by the community as a whole. Revenue bond ratings, by comparison, reflect the financial conditions and management capability of a water/wastewater utility. They are repaid with revenues generated from user fees.

There are currently three major rating agencies for municipal bonds: Moody's Investors Services, S&P, and Fitch Ratings. Of the three rating agencies, Moody's and S&P's rate over 80% of all municipal and corporate bonds (these are also the only two rating agencies included in EPA's 1997 Guidance). Municipal bond reports from these agencies can be accessed at:

• Moody's Investors rating service: www.moodys.com

• S&P rating service: www.standardandpoors.com

Table 6-1 shows how ratings from these agencies translate into "strong," "mid-range," and "weak" scores in terms of the FCI.

In its 1997 Guidance, EPA notes that there are many small- and medium-sized communities that have not used debt financing and therefore have no bond rating. EPA states that when a bond rating is unavailable, this indicator can be excluded from the secondary screening analysis. However, this will effectively place a greater reliance on scores for the socioeconomic and financial management indicators.

Net debt as a percentage of Fair Market Property Value (FMPV)

The second financial benchmark measures a municipality's outstanding GO debt as a percentage of FMPV. This indicator is intended to provide a measure of debt burden on residents within your service area/community, as well as a measure of the ability of your local government to issue additional debt.

To calculate net debt as a percentage of FMPV, it is first necessary to identify the direct net debt of your community, as well as your community's share of debt from overlapping entities. EPA defines overall net debt as debt repaid by property taxes within a utility/municipality's service area. It excludes debt that is repaid by special user fees (e.g., revenue bonds). The percentage of your community's share of debt from overlapping entities is the amount charged to persons or property with your service area (based on the estimated FMPV of real property of each overlapping jurisdictions).

Debt information is typically available from your community's annual financial statements. FMPV data should be available through your community or State assessor's office (EPA's 1997 Guidance states that as long as your service area boundaries generally conform to one or more community boundaries, it is not necessary to prorate the FMPV).

In some communities, the tax assessed property value will not reflect FMPV. This occurs when the tax assessment ratio is less than one. In such cases, FMPV can be computed by dividing the total tax assessment value by the assessment ratio (i.e., the percentage of the FMPV that is taxed at the established tax rate).

If the net debt for your community is greater than 5% of the FMPV, you would receive a "weak" rating for this indicator, based on EPA's scoring methodology. A net debt of 2% to 5% of FMPV is considered "mid-range," while below 2% is considered "strong."

Unemployment rate

The unemployment rate is defined as the percentage of the total labor force that is unemployed but actively seeking employment and willing to work. Monthly and annual average unemployment rates are available through the BLS Local Area Unemployment Statistics (LAUS) program. LAUS is a federal-state cooperative effort that maintains employment statistics for Census regions and divisions (e.g., counties and metropolitan statistical areas), cities of 25,000 population or more, and other areas. EPA Guidance does not specify whether monthly or annual data should be used, however, we recommend using the annual average unemployment rate. For more information and to access LAUS data, visit www.bls.gov/lau/data.htm.

For the purposes of calculating the overall FCI, local unemployment rates are compared to the national average as a benchmark (also available through BLS). Areas with an unemployment rate of more than 1% above the national average are rated as "weak" in this area. Areas with unem-

ployment rates within 1% of the national average is considered "mid-range" and those with unemployment rates more than one percentage point below the national average are considered "strong."

MHI

The MHI benchmark compares your community's MHI to the national MHI. As detailed in previous chapters, this information can be easily accessed from the U.S. Census Bureau ACS via AFF. Depending on the size of your community, you will need to use single-year, three-year average, or five-year average ACS estimates. These estimates are adjusted for inflation by the ACS.

In terms of the overall FCI, a community is considered weak for this indicator if MHI is more than 25% below the national MHI, mid-range if MHI is within 25% of the national MHI, and strong if MHI is more than 25% above the national MHI.

Tax revenues as a percentage of FMPV

This indicator, which EPA also refers to as the "property tax burden," is intended to measure the funding capacity available to support debt based on the wealth of the community, as well as the effectiveness of management in providing community services (1997 Guidance).

FMPV data should be readily available through the community or state's assessor office, while property tax revenues are typically available in a community's annual financial statements. If a community's property tax revenues are greater than 4% of FMPV, a "weak" rating is assigned for this indicator; between 2% and 4% is considered mid-range; and below 2% is considered strong.

Property tax collection rate

The property tax collection rate is intended to measure of the efficiency of the tax collection system and the acceptability of tax levels to residents. To determine the collection rate, you will need to divide property tax revenues by the property taxes levied. However, be aware that this metric may understate the effort your community is making if it relies less than the typical community on property taxes and more on, say, sales taxes, user fees, special fees, and assessments. See the following section for more on this issue.

To calculate property taxes levied, multiply the assessed value of real property within your community/service area by the property tax rate. This information should

be available through your community or state assessor's office. Property tax revenues are typically available in your community's annual financial statements.

For this indicator, if the property tax collection rate in your community is below 94%, you will receive a "weak" rating; between 94% and 98% is considered mid-range; and above 98% is considered "strong."

Alternative Measures of Utility Financial Capability

Chapter 1 of this Assessment Tool provides several suggestions for supplemental measures that would help to provide a better assessment of utility financial capability. The following sections provide instructions for developing and analyzing these measures.

It is important to note that the measures suggested below may not necessarily apply to your community, and that there may be additional financial indicators not reflected here that may be particularly relevant for your community. In developing evidence to support a determination on whether your utility has the financial capability to implement regulatory mandates, it is important to investigate relevant measures and metrics specific to your community.

Local tax revenues as a percent of gross taxable resources

As discussed previously, EPA uses property tax revenues as a percentage of FMPV as its sole measure of local tax burden. However, in cities that rely on multiple forms of taxation, focusing solely on property taxes inevitably understates a city's current tax effort. To account for multiple forms of taxation, total local tax revenues as a percentage of gross taxable resources should be included as a supplemental measure in EPA's FCI (in addition to real property taxes as a percentage of FMPV). This would provide a better measure of the extent to which a municipality is already using the full range of its taxable resources.

Gross taxable resources are the combined dollar amount of resident household incomes and business surpluses (income less employee compensation) within a community (NYC Independent Budget Office, 2007). Tax effort is the ratio of direct and overlapping government tax collections to taxable resources. In 2007, the NYC Independent Budget Office developed a report comparing state and local taxes in large U.S. cities (NYC Independent Budget Office, 2007). This report provides a methodology for determining a city/municipality's total taxable resources and is available at

www.ibo.nyc.ny.us/iboreports/CSALTFINAL.pdf. Total tax revenues should be available within your community's annual financial reports.

Measuring the severity of unemployment

Chapter 1 of this Assessment Tool discusses the limitations associated with the application of current annual average unemployment as a key indicator of utility financial capability. To provide a more accurate measure of whether local economic problems are severe enough to warrant relief from EPA mandates, the following measures are suggested:

• The current and long-term average unemployment rate in your community compared to the long-term national average. Between 1991 and 2011, the national unemployment rate averaged 5.8%. Use of the long-term average level of unemployment as a benchmark anchors the national unemployment rate as a comparison measure. For example, in 2010 a community with an unemployment rate of 10.1% would be classified as having only a mid-range unemployment problem simply because it was within 1% of the national average of 9.1% in that year.

• Long-term unemployment compared to national long-term unemployment. The annual average unemployment rate does not reflect trends in long-term unemployment (defined as the share of the labor force continuously unemployed for one half year or more). Use of the long-term unemployment rate provides an additional measure of economic distress within a community.

In addition to broadening the range of labor market indicators, other measures of local economic distress, such as foreclosure rates and annual migration/population data, can provide insight into the financial capability of a community or utility to fund mandated programs. In many communities, high foreclosure rates have had a significant impact on the financial condition of local governments, and their ability to finance capital improvements. In addition, chronic joblessness leads working-age residents to migrate to areas where they have a better chance of finding a job. This kind of migration does not show up in unemployment rates, but it can permanently affect a community's ability to support investments in water and wastewater systems.

The deterioration of local government financial capabilities

To take into account the erosion of local government finances, a measure of local government revenue growth or decline can be included in EPA's FCI matrix, with an absolute decline in real revenues over some period taken as a sign of weakened financial capacity. Revenue growth or decline should be measured over a long enough period of time to ascertain a trend (e.g., the last 3 to 5 years). This information should be available from your local government's annual financial reports.

Ignoring other long-term liabilities

EPA's methodology for assessing municipalities' financing capacity takes into account their formal debt burden (measured by the ratio of net debt to underlying property values). But it does not consider a burden that for a growing number of municipalities is greater than the burden of formal debt—unfunded pension liabilities and other commitments to retirees, as well as other long-term contractual commitments. The value of unfunded long-term liabilities over time should be included as a supplemental measure of utility financial capability (e.g., in comparison to available resources for meeting these commitments).

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Workbook 2

Accessing American Community Survey Data at the Community, National, and Census-Tract Levels

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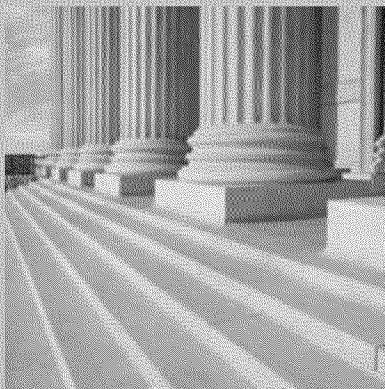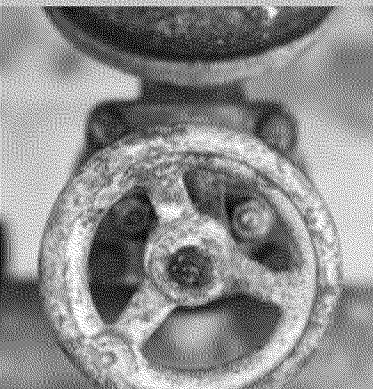
Workbook 2: Accessing American Community Survey Data at the Community, National, and Census-Tract Levels

This workbook contains information to aid users in accessing socioeconomic data from the U.S. Census Bureau American Community Survey (ACS) at the city/community, national, and census-tract levels. The document contains the following sections:

1. ACS: Provides an overview of the ACS and the ACS data you will need to conduct your affordability assessment.

2. Accessing city/community- and national-level statistics: Provides step-by-step instructions for accessing data from the ACS at the city/community and national levels.

3. Accessing and mapping data at the census-tract level: Provides guidance for downloading and mapping data from the ACS at the census-tract level.

4. ACS source tables: Provides the specific ACS source tables for the data you will need to obtain through ACS to conduct your affordability assessment.

1. American Community Survey

The U.S. Census Bureau ACS serves as the primary source of data used to develop the affordability measures recommended throughout this guidance. ACS data sets can be used to access socioeconomic data that will allow you to better examine indicators of economic need within your community, including:

• Income levels and income distribution for different types of households

• Poverty rates

• Unemployment rates

• Households receiving public assistance and/or food stamps

• Some information on housing costs and housing burden

ACS data are also used in this Assessment Tool to develop specific affordability metrics, such as comparing average household water and wastewater bills to the median household income (MHI) for each income quintile, and examining the U.S. Environmental Protection Agency's residential indicator at the census-tract level to identify potentially vulnerable communities.

The ACS is a household survey conducted by the U.S. Census Bureau with a current annual sample size of approximately 3.5 million households. The ACS replaced sample (long-form) data from the Census and is now the only source of data on income, poverty status, education, employment, and most housing characteristics. ACS estimates are released in three ways: annually (for geographic areas with populations of 65,000 or more); as a three-year average (for geographic areas with populations of 20,000 or more); and as a five-year average (for all geographies, down to the Census Block Group level). The ACS is considered the most reliable source of detailed socioeconomic data currently available, and is the only source of data available for small geographies.

ACS data are available on the Census Bureau's American FactFinder website, which can be found at http://factfinder2.census.gov. One-year estimates are typically released for the previous year every September; three-year estimates in October; and five-year estimates in December.

Throughout this workbook, we recommend using the ACS to collect socioeconomic data at the city or service area level (i.e., using single-year or three-year average ACS estimates), as well as at smaller geographic scales (e.g., at the census-tract level using five-year average ACS estimates). Analyses of these data on a smaller scale (such as at the census-tract or neighborhood level) can help to identify vulnerable populations and assess potential environmental justice concerns.

The following sections provide additional information and step-by-step instructions for accessing, reporting, and mapping both one-year and five-year average ACS estimates. This includes guidance on navigating the American FactFinder website, specific source tables for socioeconomic data, and how to select the correct geographic area (e.g., place within a state, county, metropolitan service area) for your service area.

2. Accessing City/Community- and National-level Data

1. Access the American FactFinder website: http://factfinder2.census.gov/.

2. Click the "Search" tab located on the upper left-hand side of the page, and ensure that the "Your Selections" box is empty. If there are selections inside the box, click "X" to remove them.
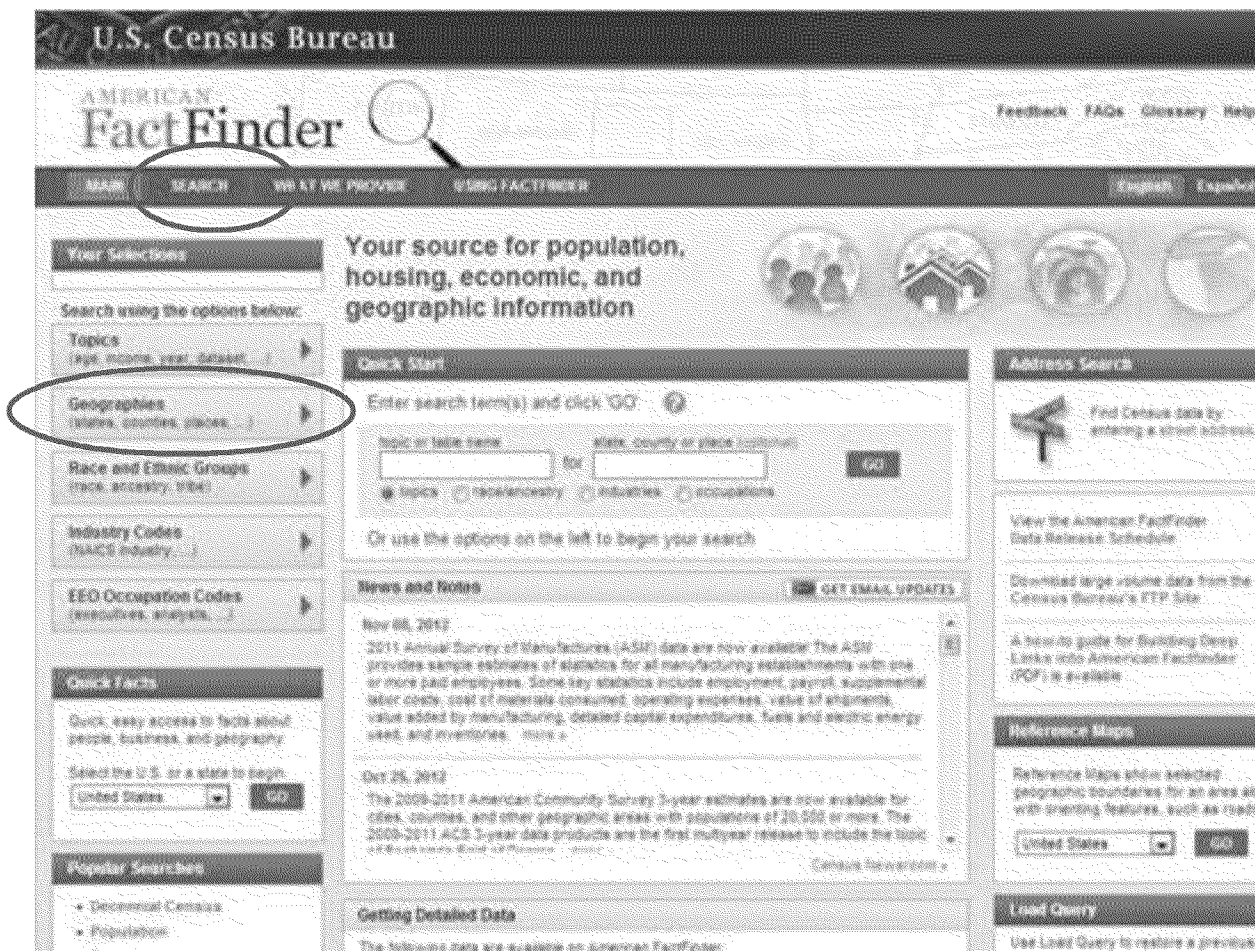
3. Select geographic area.

- On the left-hand side of the page, select "Geographies."

- A pop-up box will appear that allows you to select your desired "geographic type" (e.g., United States, State, County, Place within a State, etc.). The geographic type selected will depend on the coverage area of your utility. For example, if your utility's service area roughly follows county boundaries, you will want to select "County" as the geographic type. The geographic type "Place within State" captures most cities, while "Metro Statistical Area/Micro Statistical Areas" (MSAs) extend beyond city boundaries, including suburbs and related economic areas. For more information on geographic types, see the Census Bureau's Geographic Areas Reference Manual (available at http://www.census.gov/geo/reference/garm.html).

- If you are interested in collecting national-level data, you do not need to select "Geographies"; you can move to the next step.

- After selecting the geographic type, you will be asked to select your specific geographic area. For example, the figure below shows the geographic type of "Metro Statistical Area/Micro Statistical Area." After this is chosen, a list of MSAs will appear.

- Once you have selected your geographic area, click "Add to your selections." You can then add additional geographic areas of interest from this menu. You can also highlight multiple geographies at once (e.g., if your service area encompasses more than one county) by holding down the Ctrl button as you left-click on each geography name.

- When you are finished adding your geographic areas, click "Close" on the upper right-hand side of the "Select Geographies" pop-up box.
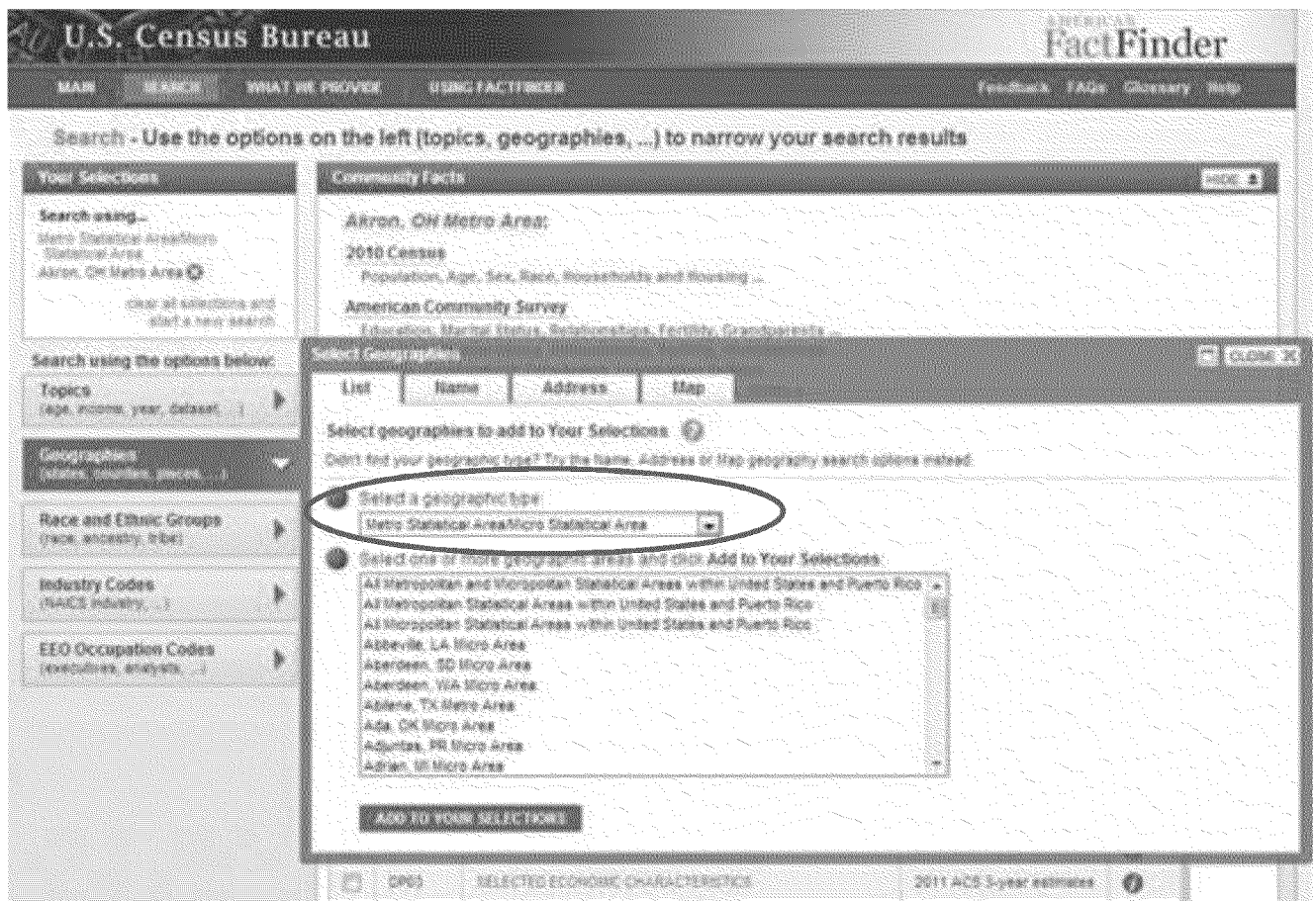
4. Select relevant socioeconomic data.

- Once you close the "Geographies" box, search results will be displayed. The search results include the tables, files, or documents available for the selected geographic areas.

- There will likely be a number of files available. To narrow down your options, you can enter the specific ACS table number or topic in which you are interested in the "Narrow your search" box located above the list of available tables. Relevant files will appear, including options for different data sets (e.g., single-year or multi-year average estimates).

- Alternatively, you can click on the "Topics" box on the left-hand side of the page to narrow your search. A pop-up box will appear that will allow you to select a specific data set (e.g., one-year average estimates from current or previous years, three-year average estimates) or narrow down the field of tables available:

    To select a specific data set within the "Topics" dialog box, click on the "+" sign next to "Dataset." This will allow you to select the specific data set(s) from which you wish to collect data. The data set(s) you select will appear in the "Your Selections" box on the upper left-hand side of the screen.

    You can also narrow down the field of tables based on broad categories (e.g., "People and Housing") using the "Topics" dialog box. For example, if data on MHI were needed, click on "People," "Income & Earnings," then "Income/Earnings (Households)." The selected data set(s) will appear in the "Your Selections" box on the upper left-hand side of the screen.

    After you make your selections, click on the "X" located on the upper right-hand side of the "Topics" dialog box.

- After narrowing your search using either of these methods, the relevant tables, files, and documents will be displayed. Click on the title of the table, file, or document of interest to view it. You can also click on the box adjacent to the file and then click on "View" or "Download." The selected table will appear, as shown here.

- You can view the statistics included in the selected table, modify the table, print the table, or download the data using the buttons above the table.

3. Accessing and Mapping Data from the ACS at the Census-tract Level

The process for accessing ACS data at the census-tract level is similar to the process outlined above for community- and national-level data. However, there are a few differences in the way you will want to select your geographic area and download the data. The following provides an example of this procedure for Buffalo, New York.

1. Select geographic area.

- Once you are at the FactFinder website, select the "Geographies" tab on the left-hand side.

- Within the "Geographies" dialog box, select the "Name" tab on the upper left-hand side.

- In the "Name" tab, under "Geography Filter Options," select "Census Tract."

- Type the city name in the geography name box (e.g., Buffalo, NY) and click "GO."

- A list of options will appear for census tracts within your specifed area. Review the results and click the appropriate name where the "Geography Type" is listed as "Census Tract" (do not select any with the type "Census tract within …"). For example, with the Buffalo, NY example, you may want to choose all census tracts fully/partially within Buffalo, NY Urbanized Area, or those that are located fully within Buffalo, NY Urbanized Area.

- Your selection will appear in the "Your Selections" box on the main page. You can now click the "Close" ("X") tab to exit the "Geographies" dialog box.

2. Select relevant socioeconomic data.

- Next, you will want to narrow your search results and click on the table in which you are interested, as described above for community-/national-level data.

- Once you select the table in which you are interested, it will be presented in "Table View" mode. Before downloading the data, you can verify visually that the geographic area selected covers the correct region. To do this, click on "Create a Map," then select a value in the table to create your map.

Source: U.S. Census Bureau, 2006-2010 American Community Survey

3. If the area selected is not correct, you can download census-tract data by county, as follows:

- Go back to the main page.

- Select geographic region using "Counties" (instead of selecting by "Name").

- Click the red "X" to remove the previously selected geography.
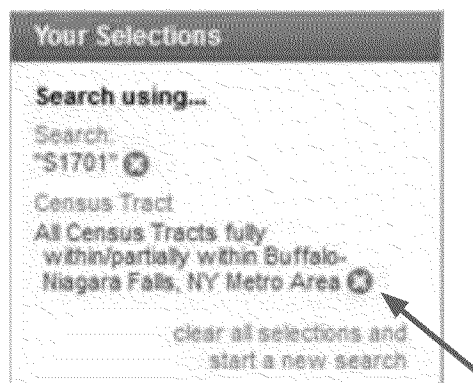
- On the "List" tab under "Geographic Type," select "Census Tract."

• Select "All Census Tracts within…" for the selected state and county.

• Click "Add to Your Selections" and close the "Geographies" window. Create a map as before and confirm that the geographic area is correct.

4. Download the data.

• Once you have the correct data file, download it by clicking "Download" on the "Table View" page and selecting the csv file format (which can be opened using Excel). This will download a series of files, including a csv file that contains the actual data and a csv "metadata" file that explains the column headers for the data. The figure below provides a snapshot of how data in the csv file are presented.

	A	B	C	D	E
1	GEO.id	GEO.id2	GEO.display-label	HD01_VD01	HD02_VD01
2	1400000U	36029000110	Census Tract 1.10, Erie County, New York	39564	7292
3	1400000U	36029000200	Census Tract 2, Erie County, New York	34091	6929
4	1400000U	36029000500	Census Tract 5, Erie County, New York	30598	14681

When working with census-tract data, it is important to evaluate the margin of error (MOE) associated with the data estimates. MOE estimates are typically located in the column immediately to the right of the data estimate. If the MOE for a specific census tract is very large, you will want to exclude that census tract from your analysis. Census tracts with large MOEs typically have very few people in them (e.g., areas with airports, parks, etc.) and are not representative of an actual population/area. Workbooks 3 and 4 describe the methodology for identifying these census tracts and excluding specific tracts.

If you plan to display the data in a geographic information system program, census tract shapefiles are available at http://www.census.gov/cgi-bin/geo/shapefiles2010/main.

A short video tutorial is available on the Census website: http://factfinder2.census.gov/help/en/virtual_tour.htm.

4. ACS Source Tables

Table 1 provides the specific source table numbers and titles for the data you will need to conduct your affordability assessment. These tables can be accessed using single-year, three-year average, and five-year average ACS estimates, as well as data sets from previous years. Much of these data can also be found in ACS Summary files: Selected Social Charac-teristics (DP02) and/or Selected Economic Characteristics (DP03).

Table 1. Location of relevant statistics

Statistic	File ID	File title
Population	DP02	Selected Social Characteristics
Household size	DP02	Selected Social Characteristics
MHI	B19013	Median Household Income in the Past 12 months (in inflation-adjusted dollars)
MHI, owner-occupied and renter-occu-pied households	B25119	Median Household Income in the Past 12 Months (in inflation-adjusted dollars) by Tenure
MHI, elderly households	B19049	Median Household Income in the Past 12 Months (in inflation-adjusted dollars) by Age of Householder
Income distribution (16 income categories)	B19001	Household Income in the Past 12 Months (in inflation-adjusted dollars)
Income distribution, elderly households (16 income categories)	B19037	Household Income in the Past 12 Months (in inflation-adjusted dollars) by Age of Householder
Income distribution, renter- and owner-occupied households (6 categories)	B25118	Household Income in the Past 12 Months (in inflation-adjusted dollars) by Tenure
Income quintiles (upper limits)	B19080	Household Income Quintile Upper Limits
Poverty rates (all residents, children, and elderly)	S1701	Poverty Status in the Past 12 Months
Unemployment	S2301	Unemployment Status
Food stamps	S2201	Food Stamps/SNAP
Public assistance income	B19057	Public Assistance Income in the Past 12 Months for Households
Public assistance income and/or food stamps	B19058	Public Assistance Income or Food Stamps in the Past 12 Months for Households
Housing burden	B25106	Tenure by Housing Costs as a Percent-age of Household Income in the Past 12 Months

Workbook 1: EPA Guidance for Estimating the RI

This workbook provides EPA guidance for estimating the Residential Indicator (RI), as follows:

Spreadsheet 1: Provides electronic version of EPA Guidance for determining cost per household (CPH) so that formulas are automatically calculated

Spreadsheet 2: Provides formula and guidance for deflating future costs to current year using the Consumer Price Index (CPI) and calculating annualized debt service costs

Spreadsheet 3: Provides electronic version of EPA Guidance for calculating the RI so that formulas are auto

Within each spreadsheet, values that need to be update/input by the user are highlighted in blue
Values that are automatically calculated are highlighted in grey

ehold (CPH) so that formulas are

ng the Consumer Price Index (CPI) and

matically calculated

1. Cost per Household (Worksheet 1 from 1997 EPA Guidance)

		Line Number

Current Wastewater Treatment (WWT) Costs

Annual O&M Expenses (Excluding Depeciation)		100
Annual Debt Service (Principal and Interest)		101
Subtotal	0	102
(Line 100 + Line 101)		

Projected WWT and Combined Sewer Overflows (CSO) Costs
(Current Dollars)

Estimated Annual O&M Expenses (Excluding Depreciation)		103
Annual Debt Service (Principal and Interest)		104
Subtotal	0	105
(Line 103 + Line 104)		

Total Current and Projected WWT and CSO Costs

(Line 102 + Line 105)	0	106

Residential Share of Total WWT and CSO Costs

		107

Total Number of Households in Service Area

		108

Cost Per Household

	#DIV/0!	109

(Line 107/Line 108)

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2. CPI Adjustment

using the average annual CPI inflation rate for the past five years. The average inflation rate is used to calculate an adjustment factor which is multiplied by future costs to obtain the present (year) value.

CPI inflation rate, 2007–2012

	CPI	% change (i.e., inflation rate)
2007	207.342	
2008	215.303	3.84%
2009	214.537	-0.36%
2010	218.056	1.64%
2011	224.939	3.16%
2012 (June)	229.478	2.02%

1. Determine average change in CPI for last 5 years:
   Recent 5-year average CPI   2.06%

2. Calculate adjustment factor:
   Number of years until debt
   service costs begin
   Adjustment factor   1.000

3. Multiply adjustment factor by future costs
   Future costs
   Present value (i.e., deflated)
   costs $ -

For more information on CPI: http://www.bls.gov/cpi/
For most recent CPI indicies: ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt

Annualized Debt Service Costs

EPA provides guidance for determinig annualized debt service costs based on an annulization factor that reflects the local borrowing interest rate and borrowing term. This factor can be obtained on page 56 of the 1997 Guidance. It can also be calculated as follows:

Interest rate
Borrowing period   years
Annualization Factor   #DIV/0!

rent dollars using the average annual CPI inflation rate
or which is multiplied by future costs to obtain the

ation factor that reflects the local borrowing interest
It can also be calculated as follows:

3. Residential Indicator (Worksheet 2 from 1997 Guidance)

Median Household Income (MHI)

Census Year MHI	$ 50,000	201
MHI Adjustment Factor	1.02	202
Adjusted MHI (Line 201 x Line 202)	$ 51,008.94	203

Annual WWT and CSO Control CPH   #DIV/0!   204

Residential Indicator

Annual Wastewater and CSO Control
Costs per Household as a percent of
Adjusted MHI   #DIV/0!   205
Line 204/Line 203 x 100

Note: The MHI calculatio
written in the Guidance,
Census no longer reports
most recent year income
American Community Su
used in this calculation.
applied to inflate the pre
the current year. The MF
shown is from 2011 to Ju

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n is shown as it is
however, the Decennial
s income statistics. The
e from the U.S. Census
rvey (ACS) should be
A CPI adjustment can be
evious year's data to the
Il adjustment factor
ine 2012.

Workbook 3: Socioeconomic Indicators

water and wastewater rates. These indicators are discussed in detail in chapter 6 of the main guidance. Specifically, the following spreadsheets include information and templates for the following:

Socioeconomic Indicator
Spreadsheet 1: MHI, city/community-wide and by Census tract
Spreadsheet 2: MHI by household type
Spreadsheet 3: City/community-wide MHI, 2005 - 2011
Spreadsheet 4: Upper limits of household income quintiles
Spreadsheet 5: Income distribution, city/community-wide, 16 income categories
Spreadsheet 6: Income distribution, elderly households, 16 income categories
Spreadsheet 7: Income distribution, renter- and owner-occupied households, 6 income categories
Spreadsheet 8: Percent of residents living in poverty, city/community-wide and by Census tract
Spreadsheet 9: Housing burden

community. Throughout the following spreadsheets, data that you need to enter (i.e., inputs to your analyses), are highlighted in blue. Formulas and metrics that are automatically calculated are highlighted in grey.

Utility inputs

Formulas

The data presented here can be downloaded from the American Community Survey (ACS) via American Fact Finder. Data can be downloaded from Fact Finder and relevant data points (columns/rows) can be copied and pasted into this workbook. Workbook 2 provides more detailed information on accessing and downloading data from Fact Finder.

At the Census-tract level, data can be downloaded directly into comma delimited files (opened using Excel) and relevant rows can be copied/pasted into this workbook. The full comma-delimited file can also serve as an input into mapping data using GIS software (or data can be directly downloaded using GIS depending on the programs and capabilities of your utility).

The data presented here also serves as inputs into many of the affordability metrics presented in Workbook 4.

serve as indicators for whether your community
ese indicators are discussed in detail in chapter 6 of
tes for the following:

xamples of socioeconomic indicators. You can use these
preadsheets, data that you need to enter (i.e., inputs to your
re highlighted in grey.

via American Fact Finder. Data can be downloaded
is workbook. Workbook 2 provides more detailed

ned using Excel) and relevant rows can be
into mapping data using GIS software (or data can be

ted in Workbook 4.

1. MHI, Citywide (service area) and by Census tract

ACS Source Table	B19013: Median Household Income in the Past 12 Months (in Inflation-adjusted dollars)
Example City:	Philadelphia

1. Median Houshold Income, citywide

Geographic area	2011 MHI
Philadelphia	$34,207

NOTE: Census tract data is downloaded from ACS into comma-delimited files (which are opened using Excel). It is easiset to first transpose the column and rows in the downloaded files and then paste relevant columns into this spreadsheet.

MHI, by Census tract

GeoCode	Census tract ID	Census Tract	MHI	Margin of Error
1400000US42101000100	42101000100	Census Tract 1, P	80,813	11,379
1400000US42101000200	42101000200	Census Tract 2, P	37,483	13,839
1400000US42101000300	42101000300	Census Tract 3, P	73,556	11,449
1400000US42101000401	42101000401	Census Tract 4.0:	26,547	6,585
1400000US42101000402	42101000402	Census Tract 4.0:	43,838	10,204
1400000US42101000500	42101000500	Census Tract 5, P	47,039	8,532
1400000US42101000600	42101000600	Census Tract 6, P	56,250	19,779
1400000US42101000700	42101000700	Census Tract 7, P	36,614	11,856
1400000US42101000801	42101000801	Census Tract 8.0:	64,286	30,077
1400000US42101000803	42101000803	Census Tract 8.0:	76,641	30,479
1400000US42101000804	42101000804	Census Tract 8.0	70,762	18,028
1400000US42101000901	42101000901	Census Tract 9.0:	36,181	16,525
1400000US42101000902	42101000902	Census Tract 9.0:	21,250	17,877
1400000US42101001001	42101001001	Census Tract 10.(	112,679	37,901
1400000US42101001002	42101001002	Census Tract 10.(	91,319	24,494
1400000US42101001101	42101001101	Census Tract 11.(	50,199	14,200
1400000US42101001102	42101001102	Census Tract 11.(	66,226	19,504
1400000US42101001201	42101001201	Census Tract 12.(	101,081	23,122
1400000US42101001202	42101001202	Census Tract 12.(	60,873	11,170
1400000US42101001300	42101001300	Census Tract 13,	58,341	7,162
1400000US42101001400	42101001400	Census Tract 14,	53,894	23,268
1400000US42101001500	42101001500	Census Tract 15,	75,038	10,173
1400000US42101001600	42101001600	Census Tract 16,	62,425	15,342
1400000US42101001700	42101001700	Census Tract 17,	76,250	13,856
1400000US42101001800	42101001800	Census Tract 18,	70,167	23,153
1400000US42101001900	42101001900	Census Tract 19,	51,232	6,389

1400000US42101002000	42101002000	Census Tract 20,		17,792	8,325
1400000US42101002100	42101002100	Census Tract 21,		31,559	2,558
1400000US42101002200	42101002200	Census Tract 22,		23,173	16,057
1400000US42101002300	42101002300	Census Tract 23,		28,600	10,909
1400000US42101002400	42101002400	Census Tract 24,		39,216	3,562
1400000US42101002500	42101002500	Census Tract 25,		30,257	6,974
1400000US42101002701	42101002701	Census Tract 27.0		28,435	6,228
1400000US42101002702	42101002702	Census Tract 27.0		60,779	6,540
1400000US42101002801	42101002801	Census Tract 28.0		30,699	5,100
1400000US42101002802	42101002802	Census Tract 28.0		42,037	4,099
1400000US42101002900	42101002900	Census Tract 29,		43,418	7,304
1400000US42101003001	42101003001	Census Tract 30.0		35,461	6,538
1400000US42101003002	42101003002	Census Tract 30.0		22,014	4,806
1400000US42101003100	42101003100	Census Tract 31,		21,473	11,294
1400000US42101003200	42101003200	Census Tract 32,		23,159	10,489
1400000US42101003300	42101003300	Census Tract 33,		25,262	4,179
1400000US42101003600	42101003600	Census Tract 36,		18,576	2,622
1400000US42101003701	42101003701	Census Tract 37.0		33,036	6,494
1400000US42101003702	42101003702	Census Tract 37.0		35,236	8,260
1400000US42101003800	42101003800	Census Tract 38,		52,258	10,262
1400000US42101003901	42101003901	Census Tract 39.0		40,326	7,002
1400000US42101003902	42101003902	Census Tract 39.0		55,078	6,758
1400000US42101004001	42101004001	Census Tract 40.0		34,986	6,967
1400000US42101004002	42101004002	Census Tract 40.0		42,520	8,306
1400000US42101004101	42101004101	Census Tract 41.0		22,330	3,166
1400000US42101004102	42101004102	Census Tract 41.0		35,178	4,166
1400000US42101004201	42101004201	Census Tract 42.0		43,477	10,509
1400000US42101004202	42101004202	Census Tract 42.0		37,476	11,617
1400000US42101005000	10100500000%	Census Tract 50, -		**	
1400000US42101005400	42101005400	Census Tract 54,		52,016	9,023
1400000US42101005500	42101005500	Census Tract 55,		53,917	8,822
1400000US42101005600	42101005600	Census Tract 56,		34,879	37,365
1400000US42101006000	42101006000	Census Tract 60,		42,736	6,491
1400000US42101006100	42101006100	Census Tract 61,		42,039	15,006
1400000US42101006200	42101006200	Census Tract 62,		32,422	5,401
1400000US42101006300	42101006300	Census Tract 63,		20,788	7,813
1400000US42101006400	42101006400	Census Tract 64,		30,985	7,069
1400000US42101006500	42101006500	Census Tract 65,		25,659	6,893
1400000US42101006600	42101006600	Census Tract 66,		26,067	2,273
1400000US42101006700	42101006700	Census Tract 67,		24,519	5,542
1400000US42101006900	42101006900	Census Tract 69,		16,719	8,329
1400000US42101007000	42101007000	Census Tract 70,		30,721	4,969
1400000US42101007101	42101007101	Census Tract 71.0		33,438	13,854
1400000US42101007102	42101007102	Census Tract 71.0		25,320	3,528
1400000US42101007200	42101007200	Census Tract 72,		29,288	5,759

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1400000US42101007300	42101007300	Census Tract 73,		30,558	9,109
1400000US42101007400	42101007400	Census Tract 74,		25,433	8,522
1400000US42101007700	42101007700	Census Tract 77,		24,357	8,784
1400000US42101007800	42101007800	Census Tract 78,		38,038	9,792
1400000US42101007900	42101007900	Census Tract 79,		41,742	5,404
1400000US42101008000	42101008000	Census Tract 80,		32,830	14,326
1400000US42101008101	42101008101	Census Tract 81.0		29,972	25,707
1400000US42101008102	42101008102	Census Tract 81.0		31,266	3,675
1400000US42101008200	42101008200	Census Tract 82,		40,127	8,297
1400000US42101008301	42101008301	Census Tract 83.0		25,867	5,360
1400000US42101008302	42101008302	Census Tract 83.0		24,583	6,262
1400000US42101008400	42101008400	Census Tract 84,		26,399	4,416
1400000US42101008500	42101008500	Census Tract 85,		29,839	7,510
1400000US42101008601	42101008601	Census Tract 86.0		45,910	8,852
1400000US42101008602	42101008602	Census Tract 86.0		29,766	6,956
1400000US42101008701	42101008701	Census Tract 87.0		38,444	14,531
1400000US42101008702	42101008702	Census Tract 87.0		30,493	5,885
1400000US42101008801	42101008801	Census Tract 88.0		15,518	5,258
1400000US42101008802	42101008802	Census Tract 88.0		12,892	3,829
1400000US42101009000	42101009000	Census Tract 90,		21,912	4,028
1400000US42101009100	42101009100	Census Tract 91,		14,693	3,121
1400000US42101009200	42101009200	Census Tract 92,		23,365	11,027
1400000US42101009300	42101009300	Census Tract 93,		22,326	8,671
1400000US42101009400	42101009400	Census Tract 94,		19,801	2,734
1400000US42101009500	42101009500	Census Tract 95,		16,786	2,710
1400000US42101009600	42101009600	Census Tract 96,		26,940	5,434
1400000US42101009801	42101009801	Census Tract 98.0		37,667	15,555
1400000US42101009802	42101009802	Census Tract 98.0		48,404	7,436
1400000US42101010000	42101010000	Census Tract 100		40,536	5,842
1400000US42101010100	42101010100	Census Tract 101		22,813	11,498
1400000US42101010200	42101010200	Census Tract 102		18,669	5,274
1400000US42101010300	42101010300	Census Tract 103		23,659	4,713
1400000US42101010400	42101010400	Census Tract 104		33,333	13,144
1400000US42101010500	42101010500	Census Tract 105		18,291	4,065
1400000US42101010600	42101010600	Census Tract 106		24,375	18,375
1400000US42101010700	42101010700	Census Tract 107		18,727	4,501
1400000US42101010800	42101010800	Census Tract 108		18,503	3,914
1400000US42101010900	42101010900	Census Tract 109		18,788	5,378
1400000US42101011000	42101011000	Census Tract 110		24,663	2,988
1400000US42101011100	42101011100	Census Tract 111		18,835	5,415
1400000US42101011200	42101011200	Census Tract 112		24,548	5,293
1400000US42101011300	42101011300	Census Tract 113		37,996	4,592
1400000US42101011400	42101011400	Census Tract 114		29,292	9,115
1400000US42101011500	42101011500	Census Tract 115		49,734	7,267
1400000US42101011700	42101011700	Census Tract 117		62,011	46,285

1400000US42101011800	42101011800	Census Tract 118	44,638	8,543
1400000US42101011900	42101011900	Census Tract 119	35,404	3,494
1400000US42101012000	42101012000	Census Tract 120	33,194	16,224
1400000US42101012100	42101012100	Census Tract 121	34,912	4,536
1400000US42101012201	42101012201	Census Tract 122	16,351	4,955
1400000US42101012203	42101012203	Census Tract 122	21,686	7,286
1400000US42101012204	42101012204	Census Tract 122	43,187	7,810
1400000US42101012500	42101012500	Census Tract 125	52,193	7,561
1400000US42101013100	42101013100	Census Tract 131	24,514	10,250
1400000US42101013200	42101013200	Census Tract 132	17,344	4,821
1400000US42101013300	42101013300	Census Tract 133	42,733	8,378
1400000US42101013401	42101013401	Census Tract 134	62,371	17,598
1400000US42101013402	42101013402	Census Tract 134	77,438	7,703
1400000US42101013500	42101013500	Census Tract 135	48,923	8,239
1400000US42101013601	42101013601	Census Tract 136	94,583	20,825
1400000US42101013602	42101013602	Census Tract 136	73,571	19,713
1400000US42101013700	42101013700	Census Tract 137	20,431	9,291
1400000US42101013800	42101013800	Census Tract 138	23,177	5,251
1400000US42101013900	42101013900	Census Tract 139	14,985	6,491
1400000US42101014000	42101014000	Census Tract 140	19,688	9,394
1400000US42101014100	42101014100	Census Tract 141	14,491	5,788
1400000US42101014200	42101014200	Census Tract 142	67,242	6,989
1400000US42101014300	42101014300	Census Tract 143	62,455	12,241
1400000US42101014400	42101014400	Census Tract 144	28,190	15,942
1400000US42101014500	42101014500	Census Tract 145	13,807	4,174
1400000US42101014600	42101014600	Census Tract 146	22,411	9,475
1400000US42101014700	42101014700	Census Tract 147	11,658	5,756
1400000US42101014800	42101014800	Census Tract 148	17,634	11,312
1400000US42101014900	42101014900	Census Tract 149	16,528	8,038
1400000US42101015101	42101015101	Census Tract 151	18,839	16,856
1400000US42101015102	42101015102	Census Tract 151	12,170	5,503
1400000US42101015200	42101015200	Census Tract 152	13,265	3,267
1400000US42101015300	42101015300	Census Tract 153	13,843	6,375
1400000US42101015600	42101015600	Census Tract 156	16,902	15,175
1400000US42101015700	42101015700	Census Tract 157	27,043	11,459
1400000US42101015800	42101015800	Census Tract 158	47,326	8,517
1400000US42101016000	42101016000	Census Tract 160	43,886	11,233
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1400000US42101016701	42101016701	Census Tract 167	20,617	5,010
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1400000US42101016800	42101016800	Census Tract 168	31,621	4,852
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1400000US42101980300	42101980300	Census Tract 980-		**
1400000US42101980400	42101980400	Census Tract 980-		**
1400000US42101980500	42101980500	Census Tract 980-		**
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1400000US42101980800	42101980800	Census Tract 980-		**
1400000US42101980900	42101980900	Census Tract 980-		**
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2. Median Household Income by household type

ACS Source Tables:	B25119: Median Household Income in the Past 12 Months (in inflation-adjusted dollars) by Tenure; B19049: Median Household Income in the Past 12 Months (in inflation-adjusted dollars) by Age of Householder
Example City:	Kansas City, Kansas

MHI by household type

Household type	MHI (2011$)
All households	37,036
Elderly households[a]	27,955
Renter-occupied	24,898
Owner-occupied	47,272

Note: Incomes for single-family and multi-family households can be estimated using the IPUMS dataset.
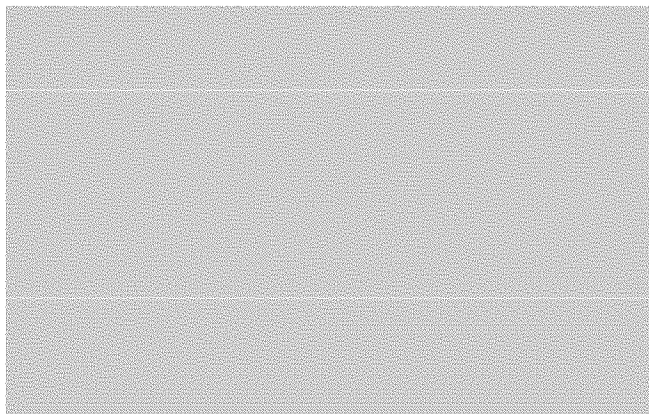
3. Median Household Income, 2005–2011

ACS Source Tables:	Table S1903: Median Household Income in the Past 12 Months (in inflation-adjusted dollars), 2005–2011 ACS single-year estimates
Example City:	Kansas City, Kansas

Year	Service area/Community MHI, real terms	Community MHI, adjusted to 2010 based on CPI	Percent change
2005	$33,157	$38,188.95	
2006	$35,777	$39,918.86	4.5%
2007	$36,211	$39,284.21	-1.6%
2008	$36,691	$38,333.13	-2.4%
2009	$34,652	$36,332.13	-5.2%
2010	$36,677	$37,834.72	4.1%
2011	$37,036	$37,036.00	-2.1%
2012			
2013			
2014			

US MHI, real terms	US MHI, adjusted to 2011 based on CPI
$46,242	$53,259.75
$48,451	$54,060.12
$50,740	$55,046.28
$52,029	$54,357.59
$50,221	$52,656.01
$50,046	$51,625.72
$50,502	$50,502.00

Year	CPI Index
2004	188.9
2005	195.3
2006	201.6
2007	207.342
2008	215.303
2009	214.537
2010	218.056
2011	224.939
2012	
2013	
2014	

$0

2005   2006   2007
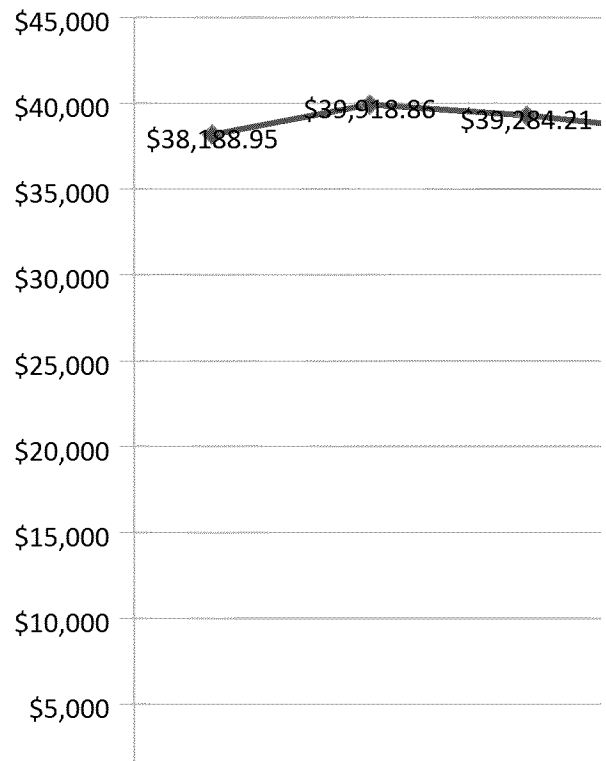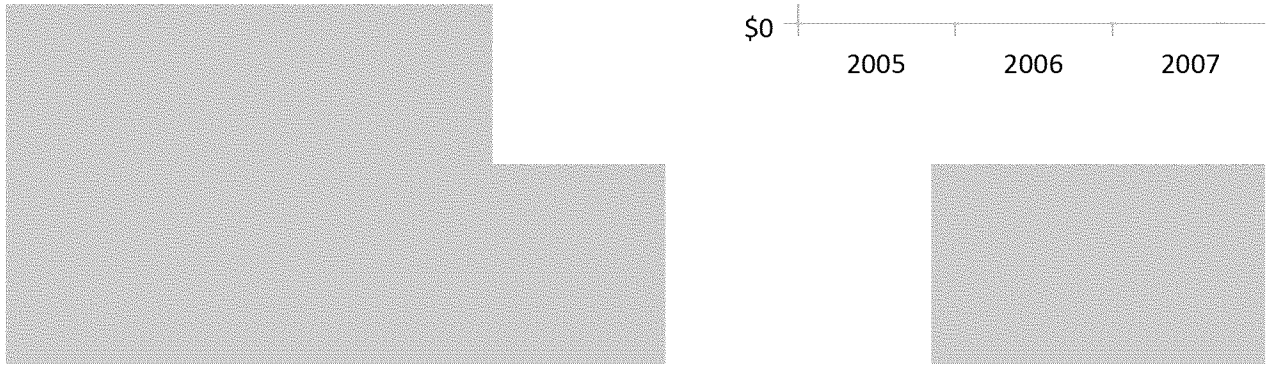
NOTE: When accessing MHI data from previous years, it is necessary to adjust for inflation. This is typically done using the CPI. The CPI index and calculations for adjusting MHI are included here.

$38,333.13

$36,332.13

$37,834.72

$37,036.00
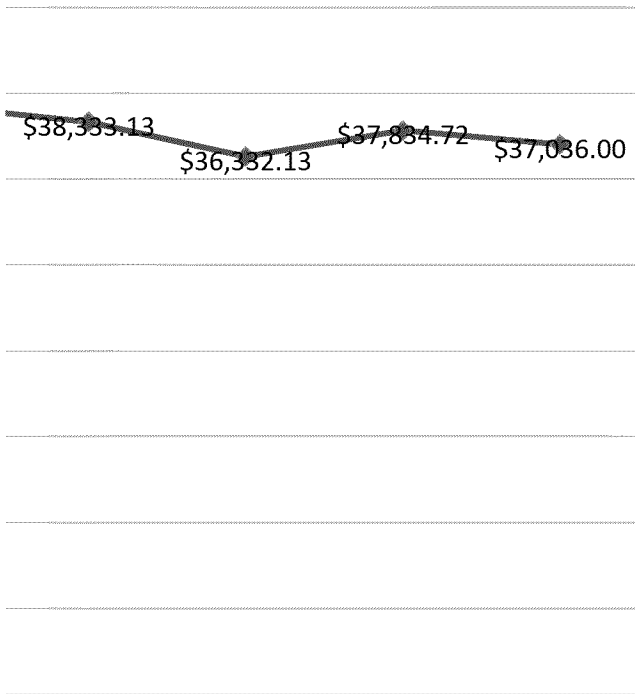
2008   2009   2010   2011

4. Household Income Quintiles

ACS Source Table:	B19080: Household Income Quintile Upper Limits, your community compared to national levels
Example City:	Atlanta, GA

Household income quintile upper limits (2011$)		
	Atlanta	United States
Lowest Quintile	12,294	20,585
Second Quintile	31,873	39,466
Third Quintile	59,043	63,001
Fourth Quintile	104,233	101,685
Lower Limit of Top 5%	246,335	187,087

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5. Household Income Distribution

ACS Source Table:	B19001: Household Income in the Past 12 Months (in inflation-adjusted dollars)
Example City:	Atlanta, GA

Household Income Distribution

	Atlanta, GA		United States	
	Households	Margin of Error	Households	Margin of Error
Total:	174,922		114,991,725	+/-179,541
Less than $10,000	28,652	+/-2,555	9,004,208	+/-48,114
$10,000 to $14,999	10,919	+/-1,611	6,678,477	+/-41,555
$15,000 to $19,999	9,547	+/-1,693	6,491,812	+/-40,369
$20,000 to $24,999	9,290	+/-1,637	6,645,572	+/-47,383
$25,000 to $29,999	7,782	+/-1,302	6,053,254	+/-41,775
$30,000 to $34,999	8,681	+/-1,594	6,100,571	+/-38,756
$35,000 to $39,999	6,966	+/-1,345	5,551,946	+/-37,413
$40,000 to $44,999	6,631	+/-1,478	5,523,655	+/-45,712
$45,000 to $49,999	4,748	+/-1,229	4,858,232	+/-37,595
$50,000 to $59,999	12,665	+/-2,040	9,169,630	+/-57,567
$60,000 to $74,999	15,832	+/-2,226	11,527,954	+/-55,219
$75,000 to $99,999	16,014	+/-2,293	13,503,035	+/-59,578
$100,000 to $124,999	11,048	+/-2,119	8,842,625	+/-46,057
$125,000 to $149,999	5,711	+/-1,296	5,021,972	+/-36,489
$150,000 to $199,999	7,461	+/-1,288	5,110,706	+/-32,148
$200,000 or more	12,975	+/-1,846	4,908,076	+/-34,049

	% total households		Cumulative % of total households	
Total:	Atlanta	US	Atlanta	US
Less than $10,000	16.4%	7.8%	16.4%	7.8%
$10,000 to $14,999	6.2%	5.8%	22.6%	13.6%
$15,000 to $19,999	5.5%	5.6%	28.1%	19.3%
$20,000 to $24,999	5.3%	5.8%	33.4%	25.1%
$25,000 to $29,999	4.4%	5.3%	37.8%	30.3%
$30,000 to $34,999	5.0%	5.3%	42.8%	35.6%
$35,000 to $39,999	4.0%	4.8%	46.8%	40.5%
$40,000 to $44,999	3.8%	4.8%	50.6%	45.3%
$45,000 to $49,999	2.7%	4.2%	53.3%	49.5%
$50,000 to $59,999	7.2%	8.0%	60.5%	57.5%
$60,000 to $74,999	9.1%	10.0%	69.6%	67.5%
$75,000 to $99,999	9.2%	11.7%	78.7%	79.2%
$100,000 to $124,999	6.3%	7.7%	85.1%	86.9%
$125,000 to $149,999	3.3%	4.4%	88.3%	91.3%
$150,000 to $199,999	4.3%	4.4%	92.6%	95.7%
$200,000 or more	7.4%	4.3%	100.0%	100.0%

Less than $10,000 $10,000 to $14,999 $15,000 to $19,999 $20,000 to $24,999 $25,000 to $29,999 $30,000 to $34,999 $35,000 to $39,999 $40,000 to $44,999 $45,000 to $49,999 $50,000 to $59,999 $60,000 to $74,999 $75,000 to $99,999 $100,000 to $124,999 $125,000 to $149,999 $150,000 to $199,999 $200

US ▬▬▬ Atlanta

,000 or more

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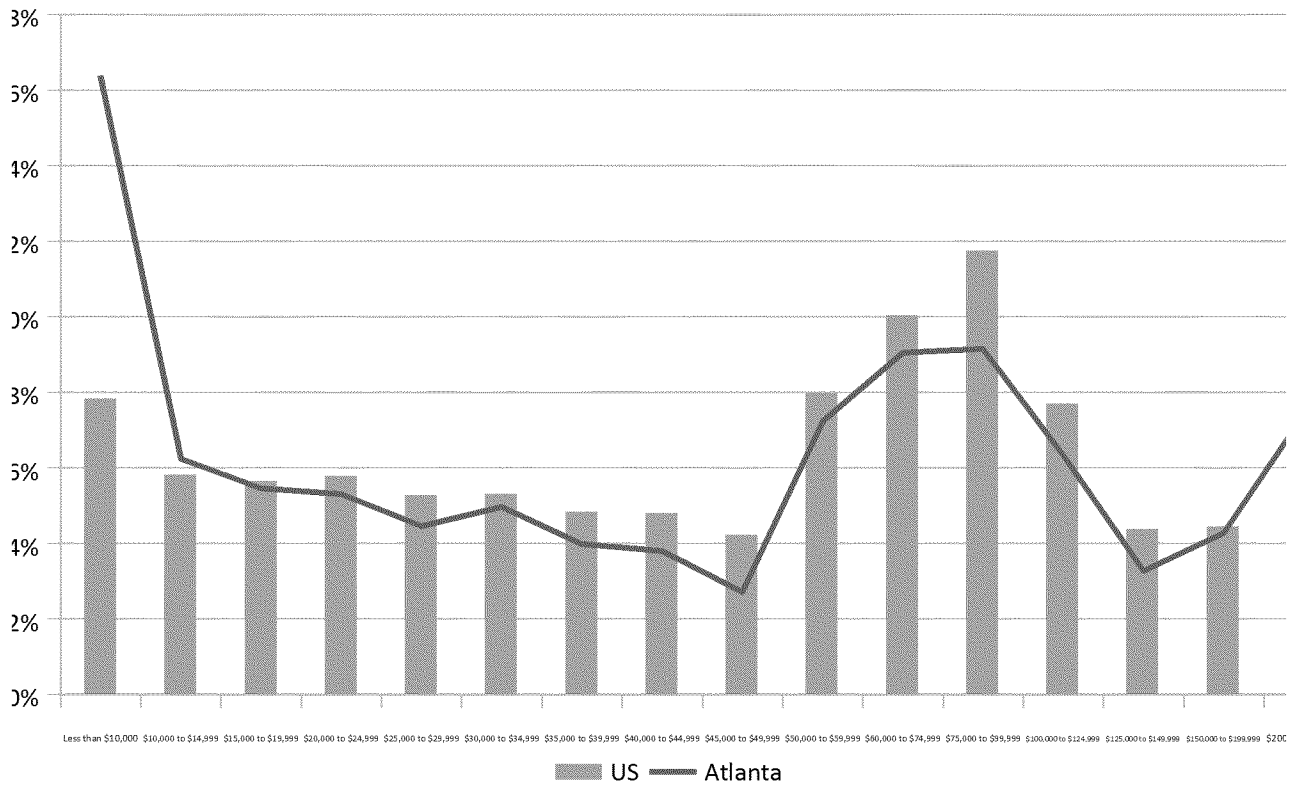
6. Income distribution, households with householders 65 years and older, 20

ACS Source Table:	B19037: Household Income in the Past 12 Months (in Inflation-adjusted dollars), by Age of Householder
Example City:	Atlanta, GA

Total households	All households			Elderly households		
	174,922			27,524		
	Households	% of households	%, cumulative	Households	% of households	%, cumulative
Less than $10,000	28,652	16.4%	16.4%	5,857	21.3%	21.3%
$10,000 to $14,999	10,919	6.2%	22.6%	3,685	13.4%	34.7%
$15,000 to $19,999	9,547	5.5%	28.1%	2,336	8.5%	43.2%
$20,000 to $24,999	9,290	5.3%	33.4%	2,538	9.2%	52.4%
$25,000 to $29,999	7,782	4.4%	37.8%	1,556	5.7%	58.0%
$30,000 to $34,999	8,681	5.0%	42.8%	961	3.5%	61.5%
$35,000 to $39,999	6,966	4.0%	46.8%	814	3.0%	64.5%
$40,000 to $44,999	6,631	3.8%	50.6%	919	3.3%	67.8%
$45,000 to $49,999	4,748	2.7%	53.3%	860	3.1%	70.9%
$50,000 to $59,999	12,665	7.2%	60.5%	1,054	3.8%	74.8%
$60,000 to $74,999	15,832	9.1%	69.6%	1,471	5.3%	80.1%
$75,000 to $99,999	16,014	9.2%	78.7%	1,260	4.6%	84.7%
$100,000 to $124,999	11,048	6.3%	85.1%	1,163	4.2%	88.9%
$125,000 to $149,999	5,711	3.3%	88.3%	649	2.4%	91.3%
$150,000 to $199,999	7,461	4.3%	92.6%	487	1.8%	93.0%
$200,000 or more	12,975	7.4%	100.0%	1,914	7.0%	100.0%

Less than $10,000 | $10,000 to $14,999 | $15,000 to $19,999 | $20,000 to $24,999 | $25,000 to $29,999 | $30,000 to $34,999 | $35,000 to $39,999 | $40,000 to $44,999 | $45,000 to $49,999 | $50,000 to $59,999 | $60,000 to $74,999 | $75,000 to $99,999 | $100,000 to $124,999 | $125,000 to $149,999 | $15...

Elderly households — All households

$0.000 to $199,999 $200,000 or more
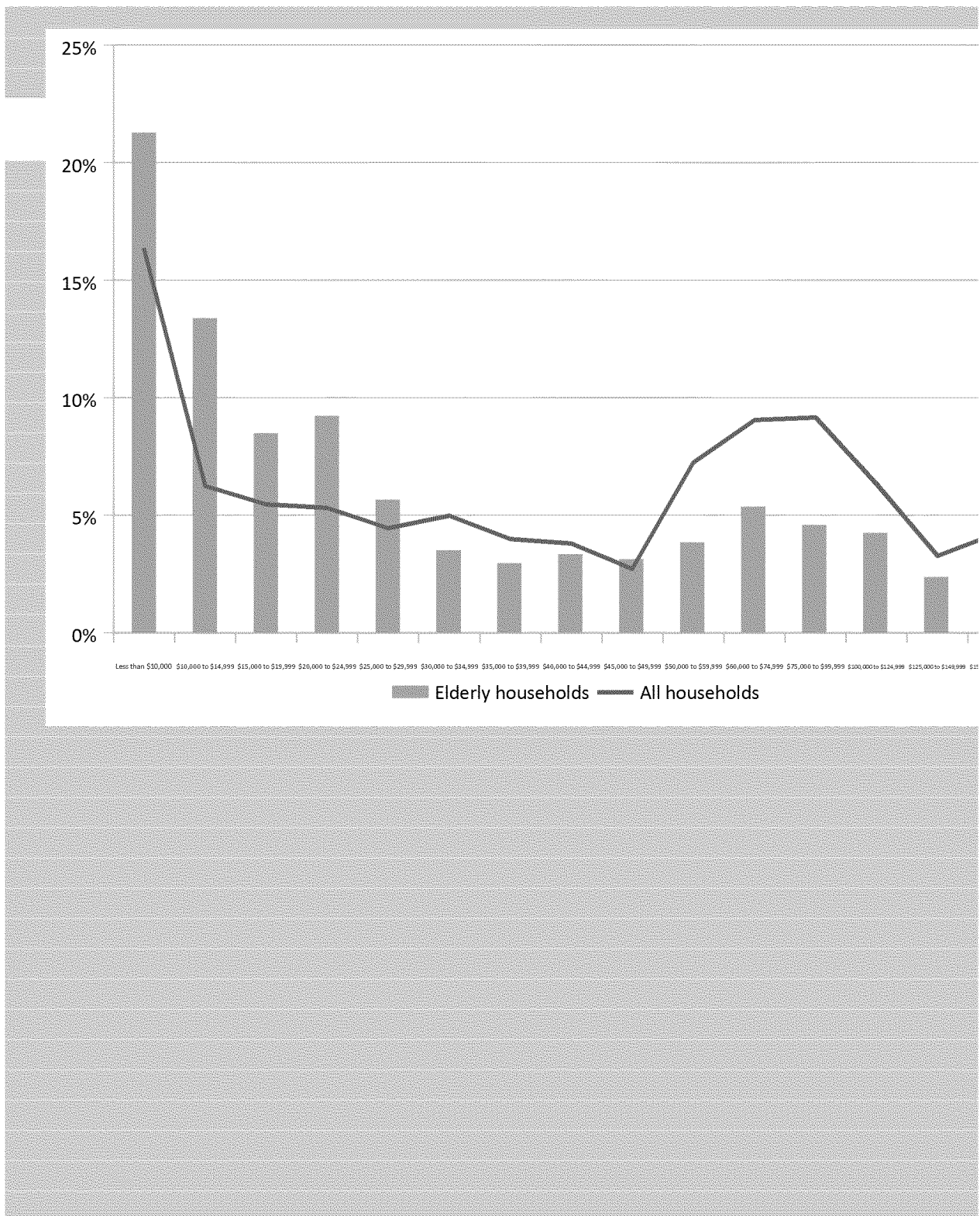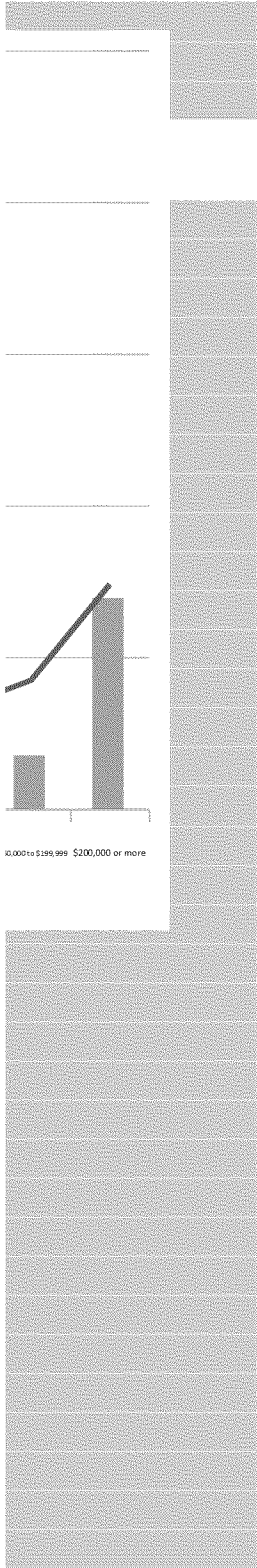
7. Income distribution, renter- and owner-occupied households

ACS Source Table:	B25119: Household Income in the Past 12 Months (in Inflation-adjusted dollars), by Tenure
Example City:	Atlanta, GA

Income distribution: Total households

	Tenure	Total Households	Less than $20,000	$20,000 to $34,999	$35,000 to $49,999
Atlanta, GA	Owner	77,500	10,678	8,894	8,417
	Renter	97,422	38,440	16,859	9,928

Income distribution: Percentage of total households

	Tenure	Total Households	Less than $20,000	$20,000 to $34,999	$35,000 to $49,999
	Owner	44.3%	13.8%	11.5%	10.9%
	Renter	55.7%	39.5%	17.3%	10.2%

Owner   Renter

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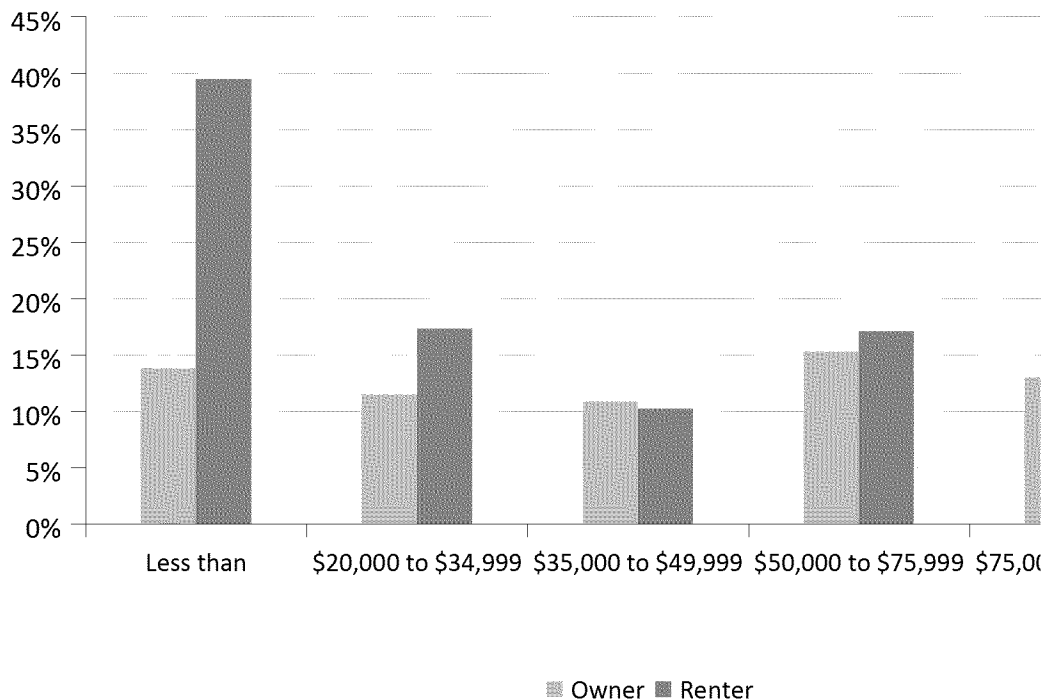
olds

$50,000 to $75,999	$75,000 to $99,999	$100,000 or more
11,825	10,052	27,634
16,672	5,962	9,561

$50,000 to $75,999	$75,000 to $99,999	$100,000 or more
15.3%	13.0%	35.7%
17.1%	6.1%	9.8%

)0 to $99,999 $100,000 or more
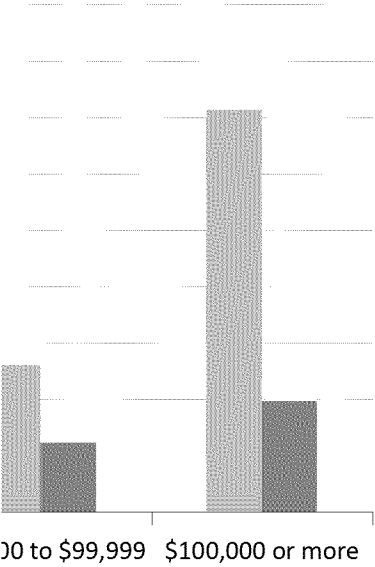
8. Poverty rates and poverty areas, citywide (service area) and by Census trac

ACS Source Table	S1701: Poverty Status in the Last 12 Months
Example City:	Philadelphia

Percent of residents living in poverty, citywide

	Population for whom poverty status is determined	Residents living below poverty level	Percent of residents living below poverty level
All residents	1,492,682	423,305	28.4%
Under 18 years	341,234	134105	39.30%
Residents age 65 or older	179,248	31073	17.34%

Percent of residents living in poverty, by Census tract

GeoCode	Census tract ID	Census Tract	Population for whom poverty status is determined	Residents below poverty level (population for whom poverty status is determined)
1400000US42101000100	42101000100	Census Tract 1, P	3026	364
1400000US42101000200	42101000200	Census Tract 2, P	1761	147
1400000US42101000300	42101000300	Census Tract 3, P	2983	338
1400000US42101000401	42101000401	Census Tract 4.0:	2034	665
1400000US42101000402	42101000402	Census Tract 4.0:	3198	396
1400000US42101000500	42101000500	Census Tract 5, P	1082	230
1400000US42101000600	42101000600	Census Tract 6, P	833	210
1400000US42101000700	42101000700	Census Tract 7, P	2585	609
1400000US42101000801	42101000801	Census Tract 8.0:	1515	124
1400000US42101000803	42101000803	Census Tract 8.0:	3763	361
1400000US42101000804	42101000804	Census Tract 8.0∠	3054	362
1400000US42101000901	42101000901	Census Tract 9.0:	1848	565
1400000US42101000902	42101000902	Census Tract 9.0:	1783	520
1400000US42101001001	42101001001	Census Tract 10.(	2295	84
1400000US42101001002	42101001002	Census Tract 10.(	3268	335
1400000US42101001101	42101001101	Census Tract 11.(	2977	755
1400000US42101001102	42101001102	Census Tract 11.(	2444	428

1400000US42101001201	42101001201	Census Tract 12.(	3684	287
1400000US42101001202	42101001202	Census Tract 12.(	4480	686
1400000US42101001300	42101001300	Census Tract 13,	5029	1148
1400000US42101001400	42101001400	Census Tract 14,	4180	615
1400000US42101001500	42101001500	Census Tract 15,	2661	221
1400000US42101001600	42101001600	Census Tract 16,	2111	223
1400000US42101001700	42101001700	Census Tract 17,	2753	124
1400000US42101001800	42101001800	Census Tract 18,	2887	365
1400000US42101001900	42101001900	Census Tract 19,	2494	680
1400000US42101002000	42101002000	Census Tract 20,	1950	926
1400000US42101002100	42101002100	Census Tract 21,	1779	280
1400000US42101002200	42101002200	Census Tract 22,	1976	707
1400000US42101002300	42101002300	Census Tract 23,	2452	421
1400000US42101002400	42101002400	Census Tract 24,	3995	908
1400000US42101002500	42101002500	Census Tract 25,	3638	996
1400000US42101002701	42101002701	Census Tract 27.(	3797	906
1400000US42101002702	42101002702	Census Tract 27.(	3487	317
1400000US42101002801	42101002801	Census Tract 28.(	4196	1077
1400000US42101002802	42101002802	Census Tract 28.(	4776	1111
1400000US42101002900	42101002900	Census Tract 29,	3855	559
1400000US42101003001	42101003001	Census Tract 30.(	4009	670
1400000US42101003002	42101003002	Census Tract 30.(	2906	979
1400000US42101003100	42101003100	Census Tract 31,	4024	1482
1400000US42101003200	42101003200	Census Tract 32,	4948	1597
1400000US42101003300	42101003300	Census Tract 33,	6131	2444
1400000US42101003600	42101003600	Census Tract 36,	6901	3176
1400000US42101003701	42101003701	Census Tract 37.(	6774	1699
1400000US42101003702	42101003702	Census Tract 37.(	3326	954
1400000US42101003800	42101003800	Census Tract 38,	3862	176
1400000US42101003901	42101003901	Census Tract 39.(	6680	849
1400000US42101003902	42101003902	Census Tract 39.(	5561	785
1400000US42101004001	42101004001	Census Tract 40.(	4051	772
1400000US42101004002	42101004002	Census Tract 40.(	4638	481
1400000US42101004101	42101004101	Census Tract 41.(	5308	1931
1400000US42101004102	42101004102	Census Tract 41.(	7978	2005
1400000US42101004201	42101004201	Census Tract 42.(	5837	1550
1400000US42101004202	42101004202	Census Tract 42.(	4583	759
1400000US42101005000	42101005000	Census Tract 50,	0	0
1400000US42101005400	42101005400	Census Tract 54,	1318	181
1400000US42101005500	42101005500	Census Tract 55,	6663	1098
1400000US42101005600	42101005600	Census Tract 56,	1134	366
1400000US42101006000	42101006000	Census Tract 60,	6527	581
1400000US42101006100	42101006100	Census Tract 61,	3519	553
1400000US42101006200	42101006200	Census Tract 62,	4472	1289
1400000US42101006300	42101006300	Census Tract 63,	3974	1735

1400000US42101006400	42101006400 Census Tract 64,	4606	1745
1400000US42101006500	42101006500 Census Tract 65,	4812	1713
1400000US42101006600	42101006600 Census Tract 66,	4184	1512
1400000US42101006700	42101006700 Census Tract 67,	6793	2879
1400000US42101006900	42101006900 Census Tract 69,	2679	1336
1400000US42101007000	42101007000 Census Tract 70,	4882	1288
1400000US42101007101	42101007101 Census Tract 71.(	2493	754
1400000US42101007102	42101007102 Census Tract 71.(	4616	1696
1400000US42101007200	42101007200 Census Tract 72,	4550	1637
1400000US42101007300	42101007300 Census Tract 73,	3325	859
1400000US42101007400	42101007400 Census Tract 74,	4453	1776
1400000US42101007700	42101007700 Census Tract 77,	1594	597
1400000US42101007800	42101007800 Census Tract 78,	3896	899
1400000US42101007900	42101007900 Census Tract 79,	4779	721
1400000US42101008000	42101008000 Census Tract 80,	3419	1121
1400000US42101008101	42101008101 Census Tract 81.(	2512	942
1400000US42101008102	42101008102 Census Tract 81.(	5463	1500
1400000US42101008200	42101008200 Census Tract 82,	8251	1666
1400000US42101008301	42101008301 Census Tract 83.(	3745	1140
1400000US42101008302	42101008302 Census Tract 83.(	3938	1396
1400000US42101008400	42101008400 Census Tract 84,	4959	2021
1400000US42101008500	42101008500 Census Tract 85,	6591	1976
1400000US42101008601	42101008601 Census Tract 86.(	2932	653
1400000US42101008602	42101008602 Census Tract 86.(	3374	861
1400000US42101008701	42101008701 Census Tract 87.(	5029	1723
1400000US42101008702	42101008702 Census Tract 87.(	4039	2196
1400000US42101008801	42101008801 Census Tract 88.(	632	468
1400000US42101008802	42101008802 Census Tract 88.(	3535	2625
1400000US42101009000	42101009000 Census Tract 90,	2697	1678
1400000US42101009100	42101009100 Census Tract 91,	2430	1068
1400000US42101009200	42101009200 Census Tract 92,	3067	1281
1400000US42101009300	42101009300 Census Tract 93,	3868	1493
1400000US42101009400	42101009400 Census Tract 94,	3839	1588
1400000US42101009500	42101009500 Census Tract 95,	3314	1329
1400000US42101009600	42101009600 Census Tract 96,	4768	1119
1400000US42101009801	42101009801 Census Tract 98.(	2107	458
1400000US42101009802	42101009802 Census Tract 98.(	5753	830
1400000US42101010000	42101010000 Census Tract 100	5013	1245
1400000US42101010100	42101010100 Census Tract 101	4954	1646
1400000US42101010200	42101010200 Census Tract 102	2734	1065
1400000US42101010300	42101010300 Census Tract 103	2434	747
1400000US42101010400	42101010400 Census Tract 104	2999	972
1400000US42101010500	42101010500 Census Tract 105	3328	1383
1400000US42101010600	42101010600 Census Tract 106	1299	444
1400000US42101010700	42101010700 Census Tract 107	3784	1276

1400000US42101010800	42101010800 Census Tract 108	3497	1983
1400000US42101010900	42101010900 Census Tract 109	2040	1225
1400000US42101011000	42101011000 Census Tract 110	3307	968
1400000US42101011100	42101011100 Census Tract 111	3527	1792
1400000US42101011200	42101011200 Census Tract 112	5688	2037
1400000US42101011300	42101011300 Census Tract 113	3257	1083
1400000US42101011400	42101011400 Census Tract 114	7332	2519
1400000US42101011500	42101011500 Census Tract 115	4305	842
1400000US42101011700	42101011700 Census Tract 117	1202	209
1400000US42101011800	42101011800 Census Tract 118	6461	860
1400000US42101011900	42101011900 Census Tract 119	5380	1605
1400000US42101012000	42101012000 Census Tract 120	1702	296
1400000US42101012100	42101012100 Census Tract 121	2599	563
1400000US42101012201	42101012201 Census Tract 122	2924	1364
1400000US42101012203	42101012203 Census Tract 122	1290	601
1400000US42101012204	42101012204 Census Tract 122	3294	669
1400000US42101012500	42101012500 Census Tract 125	3904	582
1400000US42101013100	42101013100 Census Tract 131	1446	190
1400000US42101013200	42101013200 Census Tract 132	2589	868
1400000US42101013300	42101013300 Census Tract 133	2720	1029
1400000US42101013401	42101013401 Census Tract 134	2239	172
1400000US42101013402	42101013402 Census Tract 134	2895	454
1400000US42101013500	42101013500 Census Tract 135	3531	894
1400000US42101013601	42101013601 Census Tract 136	2250	82
1400000US42101013602	42101013602 Census Tract 136	3790	388
1400000US42101013700	42101013700 Census Tract 137	4462	2236
1400000US42101013800	42101013800 Census Tract 138	1840	398
1400000US42101013900	42101013900 Census Tract 139	2912	1592
1400000US42101014000	42101014000 Census Tract 140	2784	1706
1400000US42101014100	42101014100 Census Tract 141	1784	844
1400000US42101014200	42101014200 Census Tract 142	3133	494
1400000US42101014300	42101014300 Census Tract 143	1419	129
1400000US42101014400	42101014400 Census Tract 144	2657	795
1400000US42101014500	42101014500 Census Tract 145	1717	849
1400000US42101014600	42101014600 Census Tract 146	2027	561
1400000US42101014700	42101014700 Census Tract 147	3096	1630
1400000US42101014800	42101014800 Census Tract 148	578	223
1400000US42101014900	42101014900 Census Tract 149	2660	1177
1400000US42101015101	42101015101 Census Tract 151	2395	960
1400000US42101015102	42101015102 Census Tract 151	4814	2701
1400000US42101015200	42101015200 Census Tract 152	6293	3869
1400000US42101015300	42101015300 Census Tract 153	3436	2095
1400000US42101015600	42101015600 Census Tract 156	1784	799
1400000US42101015700	42101015700 Census Tract 157	3184	1117
1400000US42101015800	42101015800 Census Tract 158	5459	1147

1400000US42101016000	42101016000	Census Tract 160	6679	1087
1400000US42101016100	42101016100	Census Tract 161	5029	1651
1400000US42101016200	42101016200	Census Tract 162	1875	996
1400000US42101016300	42101016300	Census Tract 163	2999	1725
1400000US42101016400	42101016400	Census Tract 164	4669	2528
1400000US42101016500	42101016500	Census Tract 165	2099	1065
1400000US42101016600	42101016600	Census Tract 166	1308	500
1400000US42101016701	42101016701	Census Tract 167	2358	763
1400000US42101016702	42101016702	Census Tract 167	3272	1815
1400000US42101016800	42101016800	Census Tract 168	4031	1416
1400000US42101016901	42101016901	Census Tract 169	3640	1412
1400000US42101016902	42101016902	Census Tract 169	5248	1797
1400000US42101017000	42101017000	Census Tract 170	2673	841
1400000US42101017100	42101017100	Census Tract 171	4050	1646
1400000US42101017201	42101017201	Census Tract 172	3434	1673
1400000US42101017202	42101017202	Census Tract 172	3762	1723
1400000US42101017300	42101017300	Census Tract 173	3413	1500
1400000US42101017400	42101017400	Census Tract 174	2176	842
1400000US42101017500	42101017500	Census Tract 175	6953	4278
1400000US42101017601	42101017601	Census Tract 176	5421	3611
1400000US42101017602	42101017602	Census Tract 176	3841	2225
1400000US42101017701	42101017701	Census Tract 177	3666	1905
1400000US42101017702	42101017702	Census Tract 177	6403	4831
1400000US42101017800	42101017800	Census Tract 178	6438	3486
1400000US42101017900	42101017900	Census Tract 179	5441	1815
1400000US42101018001	42101018001	Census Tract 180	2181	246
1400000US42101018002	42101018002	Census Tract 180	5113	1218
1400000US42101018300	42101018300	Census Tract 183	4297	778
1400000US42101018400	42101018400	Census Tract 184	2052	294
1400000US42101018800	42101018800	Census Tract 188	8126	4531
1400000US42101019000	42101019000	Census Tract 190	7859	3142
1400000US42101019100	42101019100	Census Tract 191	7540	2270
1400000US42101019200	42101019200	Census Tract 192	8980	5173
1400000US42101019501	42101019501	Census Tract 195	4187	2273
1400000US42101019502	42101019502	Census Tract 195	3583	1737
1400000US42101019700	42101019700	Census Tract 197	7812	3228
1400000US42101019800	42101019800	Census Tract 198	5681	2288
1400000US42101019900	42101019900	Census Tract 199	4756	2733
1400000US42101020000	42101020000	Census Tract 200	1243	394
1400000US42101020101	42101020101	Census Tract 201	3999	1467
1400000US42101020102	42101020102	Census Tract 201	2985	1023
1400000US42101020200	42101020200	Census Tract 202	4937	1707
1400000US42101020300	42101020300	Census Tract 203	2843	960
1400000US42101020400	42101020400	Census Tract 204	2793	639
1400000US42101020500	42101020500	Census Tract 205	3119	923

1400000US42101020600	42101020600 Census Tract 206	1572	288
1400000US42101020700	42101020700 Census Tract 207	5243	501
1400000US42101020800	42101020800 Census Tract 208	1825	414
1400000US42101020900	42101020900 Census Tract 209	2918	364
1400000US42101021000	42101021000 Census Tract 210	4454	948
1400000US42101021100	42101021100 Census Tract 211	2279	318
1400000US42101021200	42101021200 Census Tract 212	2322	501
1400000US42101021300	42101021300 Census Tract 213	3079	350
1400000US42101021400	42101021400 Census Tract 214	3118	459
1400000US42101021500	42101021500 Census Tract 215	3427	374
1400000US42101021600	42101021600 Census Tract 216	1617	304
1400000US42101021700	42101021700 Census Tract 217	6092	278
1400000US42101021800	42101021800 Census Tract 218	4348	499
1400000US42101021900	42101021900 Census Tract 219	1272	110
1400000US42101022000	42101022000 Census Tract 220	1428	52
1400000US42101023100	42101023100 Census Tract 231	1177	0
1400000US42101023500	42101023500 Census Tract 235	1119	87
1400000US42101023600	42101023600 Census Tract 236	2728	259
1400000US42101023700	42101023700 Census Tract 237	4628	812
1400000US42101023800	42101023800 Census Tract 238	4243	534
1400000US42101023900	42101023900 Census Tract 239	1628	344
1400000US42101024000	42101024000 Census Tract 240	3824	1105
1400000US42101024100	42101024100 Census Tract 241	801	366
1400000US42101024200	42101024200 Census Tract 242	4064	1296
1400000US42101024300	42101024300 Census Tract 243	4857	1584
1400000US42101024400	42101024400 Census Tract 244	3517	637
1400000US42101024500	42101024500 Census Tract 245	3444	1123
1400000US42101024600	42101024600 Census Tract 246	3103	1533
1400000US42101024700	42101024700 Census Tract 247	4417	1742
1400000US42101024800	42101024800 Census Tract 248	2154	712
1400000US42101024900	42101024900 Census Tract 249	3406	886
1400000US42101025200	42101025200 Census Tract 252	6940	1607
1400000US42101025300	42101025300 Census Tract 253	3640	814
1400000US42101025400	42101025400 Census Tract 254	4167	444
1400000US42101025500	42101025500 Census Tract 255	2537	131
1400000US42101025600	42101025600 Census Tract 256	2375	267
1400000US42101025700	42101025700 Census Tract 257	3319	227
1400000US42101025800	42101025800 Census Tract 258	1695	73
1400000US42101025900	42101025900 Census Tract 259	4526	920
1400000US42101026000	42101026000 Census Tract 260	2739	195
1400000US42101026100	42101026100 Census Tract 261	2999	287
1400000US42101026200	42101026200 Census Tract 262	4333	448
1400000US42101026301	42101026301 Census Tract 263	3996	467
1400000US42101026302	42101026302 Census Tract 263	4707	747
1400000US42101026400	42101026400 Census Tract 264	5445	805

1400000US42101026500	42101026500 Census Tract 265	4562	446
1400000US42101026600	42101026600 Census Tract 266	6392	921
1400000US42101026700	42101026700 Census Tract 267	6893	1120
1400000US42101026800	42101026800 Census Tract 268	4780	934
1400000US42101026900	42101026900 Census Tract 269	1793	291
1400000US42101027000	42101027000 Census Tract 270	2409	408
1400000US42101027100	42101027100 Census Tract 271	2633	400
1400000US42101027200	42101027200 Census Tract 272	4773	361
1400000US42101027300	42101027300 Census Tract 273	6872	1241
1400000US42101027401	42101027401 Census Tract 274	2960	1127
1400000US42101027402	42101027402 Census Tract 274	7063	1881
1400000US42101027500	42101027500 Census Tract 275	4444	760
1400000US42101027600	42101027600 Census Tract 276	4065	1291
1400000US42101027700	42101027700 Census Tract 277	4274	695
1400000US42101027800	42101027800 Census Tract 278	5163	1441
1400000US42101027901	42101027901 Census Tract 279	4620	1860
1400000US42101027902	42101027902 Census Tract 279	2388	939
1400000US42101028000	42101028000 Census Tract 280	4806	1821
1400000US42101028100	42101028100 Census Tract 281	3402	910
1400000US42101028200	42101028200 Census Tract 282	4938	1042
1400000US42101028300	42101028300 Census Tract 283	6342	1840
1400000US42101028400	42101028400 Census Tract 284	4566	1639
1400000US42101028500	42101028500 Census Tract 285	2464	784
1400000US42101028600	42101028600 Census Tract 286	6643	2541
1400000US42101028700	42101028700 Census Tract 287	2402	1237
1400000US42101028800	42101028800 Census Tract 288	4801	1950
1400000US42101028901	42101028901 Census Tract 289	3747	1749
1400000US42101028902	42101028902 Census Tract 289	6804	2702
1400000US42101029000	42101029000 Census Tract 290	6183	1618
1400000US42101029100	42101029100 Census Tract 291	3933	1212
1400000US42101029200	42101029200 Census Tract 292	3809	1002
1400000US42101029300	42101029300 Census Tract 293	2483	997
1400000US42101029400	42101029400 Census Tract 294	3475	1775
1400000US42101029800	42101029800 Census Tract 298	4599	1802
1400000US42101029900	42101029900 Census Tract 299	4362	2030
1400000US42101030000	42101030000 Census Tract 300	7693	2680
1400000US42101030100	42101030100 Census Tract 301	5303	893
1400000US42101030200	42101030200 Census Tract 302	7261	1406
1400000US42101030501	42101030501 Census Tract 305	4865	1047
1400000US42101030502	42101030502 Census Tract 305	6554	1059
1400000US42101030600	42101030600 Census Tract 306	6479	1240
1400000US42101030700	42101030700 Census Tract 307	3849	549
1400000US42101030800	42101030800 Census Tract 308	4980	274
1400000US42101030900	42101030900 Census Tract 309	4385	983
1400000US42101031000	42101031000 Census Tract 310	7217	1247

1400000US42101031101	42101031101 Census Tract 311	4714	1330
1400000US42101031102	42101031102 Census Tract 311	4476	1334
1400000US42101031200	42101031200 Census Tract 312	4416	1027
1400000US42101031300	42101031300 Census Tract 313	7291	1781
1400000US42101031401	42101031401 Census Tract 314	6485	991
1400000US42101031402	42101031402 Census Tract 314	5414	1342
1400000US42101031501	42101031501 Census Tract 315	6109	616
1400000US42101031502	42101031502 Census Tract 315	3933	443
1400000US42101031600	42101031600 Census Tract 316	5873	814
1400000US42101031700	42101031700 Census Tract 317	6186	766
1400000US42101031800	42101031800 Census Tract 318	3774	471
1400000US42101031900	42101031900 Census Tract 319	4755	970
1400000US42101032000	42101032000 Census Tract 320	6958	1225
1400000US42101032100	42101032100 Census Tract 321	4323	811
1400000US42101032300	42101032300 Census Tract 323	3022	576
1400000US42101032500	42101032500 Census Tract 325	5579	1433
1400000US42101032600	42101032600 Census Tract 326	6481	1226
1400000US42101032900	42101032900 Census Tract 329	4045	721
1400000US42101033000	42101033000 Census Tract 330	7991	1830
1400000US42101033101	42101033101 Census Tract 331	4822	355
1400000US42101033102	42101033102 Census Tract 331	4141	374
1400000US42101033200	42101033200 Census Tract 332	2705	361
1400000US42101033300	42101033300 Census Tract 333	3549	250
1400000US42101033400	42101033400 Census Tract 334	4421	538
1400000US42101033500	42101033500 Census Tract 335	3714	526
1400000US42101033600	42101033600 Census Tract 336	7086	911
1400000US42101033701	42101033701 Census Tract 337	4607	1012
1400000US42101033702	42101033702 Census Tract 337	5286	289
1400000US42101033800	42101033800 Census Tract 338	6167	616
1400000US42101033900	42101033900 Census Tract 339	2983	329
1400000US42101034000	42101034000 Census Tract 340	3136	159
1400000US42101034100	42101034100 Census Tract 341	6231	697
1400000US42101034200	42101034200 Census Tract 342	3135	147
1400000US42101034400	42101034400 Census Tract 344	7670	604
1400000US42101034501	42101034501 Census Tract 345	3542	798
1400000US42101034502	42101034502 Census Tract 345	5273	610
1400000US42101034600	42101034600 Census Tract 346	2237	178
1400000US42101034701	42101034701 Census Tract 347	6459	419
1400000US42101034702	42101034702 Census Tract 347	4138	271
1400000US42101034801	42101034801 Census Tract 348	4119	363
1400000US42101034802	42101034802 Census Tract 348	5725	563
1400000US42101034803	42101034803 Census Tract 348	4793	277
1400000US42101034900	42101034900 Census Tract 349	6370	2053
1400000US42101035100	42101035100 Census Tract 351	3408	77
1400000US42101035200	42101035200 Census Tract 352	4659	157

1400000US42101035301	42101035301 Census Tract 353	5745	676
1400000US42101035302	42101035302 Census Tract 353	4599	399
1400000US42101035500	42101035500 Census Tract 355	7506	1110
1400000US42101035601	42101035601 Census Tract 356	5554	569
1400000US42101035602	42101035602 Census Tract 356	3537	261
1400000US42101035701	42101035701 Census Tract 357	5116	840
1400000US42101035702	42101035702 Census Tract 357	3627	599
1400000US42101035800	42101035800 Census Tract 358	6285	587
1400000US42101035900	42101035900 Census Tract 359	5131	429
1400000US42101036000	42101036000 Census Tract 360	2687	246
1400000US42101036100	42101036100 Census Tract 361	4278	477
1400000US42101036201	42101036201 Census Tract 362	4945	222
1400000US42101036202	42101036202 Census Tract 362	6520	477
1400000US42101036203	42101036203 Census Tract 362	4608	411
1400000US42101036301	42101036301 Census Tract 363	3894	224
1400000US42101036302	42101036302 Census Tract 363	3487	525
1400000US42101036303	42101036303 Census Tract 363	6503	489
1400000US42101036400	42101036400 Census Tract 364	228	147
1400000US42101036501	42101036501 Census Tract 365	5707	725
1400000US42101036502	42101036502 Census Tract 365	3961	85
1400000US42101036600	42101036600 Census Tract 366	1308	36
1400000US42101036700	42101036700 Census Tract 367	2389	168
1400000US42101036900	42101036900 Census Tract 369	1133	389
1400000US42101037200	42101037200 Census Tract 372	4206	428
1400000US42101037300	42101037300 Census Tract 373	4685	479
1400000US42101037500	42101037500 Census Tract 375	3416	518
1400000US42101037600	42101037600 Census Tract 376	1858	337
1400000US42101037700	42101037700 Census Tract 377	3522	1971
1400000US42101037800	42101037800 Census Tract 378	1764	309
1400000US42101037900	42101037900 Census Tract 379	4354	890
1400000US42101038000	42101038000 Census Tract 380	2298	342
1400000US42101038100	42101038100 Census Tract 381	608	285
1400000US42101038200	42101038200 Census Tract 382	2686	1058
1400000US42101038300	42101038300 Census Tract 383	3346	1640
1400000US42101038400	42101038400 Census Tract 384	2410	70
1400000US42101038500	42101038500 Census Tract 385	1855	103
1400000US42101038600	42101038600 Census Tract 386	1408	132
1400000US42101038700	42101038700 Census Tract 387	1686	63
1400000US42101038800	42101038800 Census Tract 388	3525	408
1400000US42101038900	42101038900 Census Tract 389	2996	506
1400000US42101039000	42101039000 Census Tract 390	7698	2176
1400000US42101980000	42101980000 Census Tract 980	519	420
1400000US42101980100	42101980100 Census Tract 980	24	0
1400000US42101980200	42101980200 Census Tract 980	98	11
1400000US42101980300	42101980300 Census Tract 980	0	0

1400000US42101980400	42101980400	Census Tract 980	0	0
1400000US42101980500	42101980500	Census Tract 980	0	0
1400000US42101980600	42101980600	Census Tract 980	0	0
1400000US42101980700	42101980700	Census Tract 980	0	0
1400000US42101980800	42101980800	Census Tract 980	0	0
1400000US42101980900	42101980900	Census Tract 980	0	0
1400000US42101989100	42101989100	Census Tract 989	145	85

Supplemental Poverty Measure

Nationwide, the Supplemental Poverty Measure (SPM, see chapter 4) indicates that there are 5.35% more people in poverty than the official poverty threshold would indicate. The SPM also indicates that inside Metropolitan Statistical Areas the difference is 11.2% (and within "principal cities," the SPM-implied number of people in poverty is 5.94% higher than the official poverty measure indicates).

Although the SPM is not yet available at the city/community level, these general rules can be applied here to identify additional households that may be adversely impacted by increased water and wastewater rates.

Percent below poverty level (population for whom poverty status is determined)	Census tract is a poverty area (i.e., >20% of residents are living in poverty)
12%	
8%	
11%	
33%	
12%	
21%	
25%	
24%	
8%	
10%	
12%	
31%	
29%	
4%	
10%	
25%	
18%	

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	5%
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	27%
	47%
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	59%

9 Housing burden for renter- and owner-occupied households, by income lev

ACS Source Table:	B25106: Tenure by Housing Costs as a Percentage of Household Income in the Past 12 Months
Example City:	Madison, WI

Income category	Housing burden, Owner-occupied households			
	Less than 20%	20 to 29%	30% or more	Total
Less than 20,000	46	76	1,984	2,106
$20,000 to $34,999	330	439	3,242	4,011
$35,000 to $49,999:	991	2,035	3,096	6,122
$50,000 to $74,999:	2,945	4,485	2,652	10,082
$75,000 or more	16,186	7,710	2,694	26,590
Zero or negative income	175			

Income category	Housing burden, Renter-occupied households			
	Less than 20%	20 to 29%	30% or more	Total
Less than $20,000:	15,456	334	178	15,968
$20,000 to $34,999:	8,979	470	1,884	11,333
$35,000 to $49,999:	1,751	1,187	4,175	7,113
$50,000 to $74,999:	1,304	3,990	2,541	7,835
$75,000 or more:	108	6,584	925	7,617
Zero or negative income	415			
No cash rent	472			

Percent of households with greater than 30% housing burden		
	Owner-occupied	Renter-occupied
Less than $20,000:	94.2%	1.1%
$20,000 to $34,999:	80.8%	16.6%
$35,000 to $49,999:	50.6%	58.7%
$50,000 to $74,999:	26.3%	32.4%
$75,000 or more:	10.1%	12.1%

Percentage of renter- and owner-occupied households paying more than 30% of their income for housing

Less than $20,000: $20,000 to $34,999: $35,000 to $49,999: $50,000 to $74,999: $75,000 or more:

■ Owner-occupied ▦ Renter-occupied
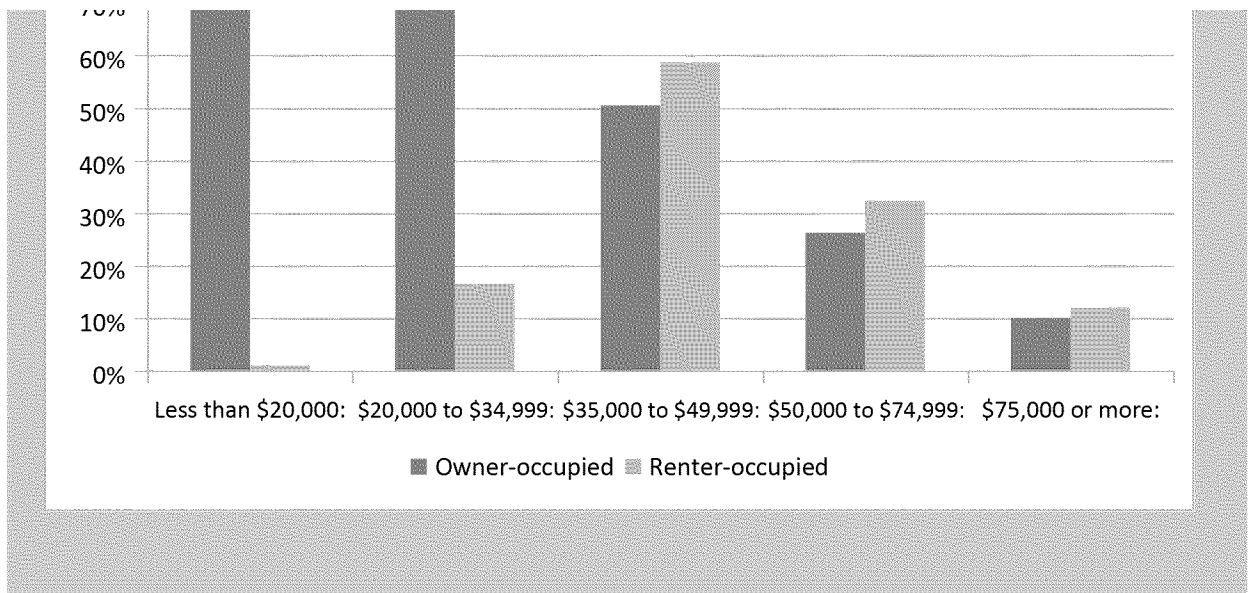
The following graphs show the total number of households, by income category, with a housing burden of less than 20%, 20 to 29%, and 30% or more, by household tenure (owner vs. renter). These graphs show that for Madison, Wisconsin, a relatively few number of owner-occupied households have a housing burden of greater than 30%. However, it also shows that very few households in the lower income categories own their homes. This may be another indicator of affordability. The graph showing housing burden for renter-occupied households shows that very few renter-occupied households pay more than 30% for housing.

Housing burden by income category, owner-occupied households

Legend: 30% or more · 20 to 29% · Less than 20%
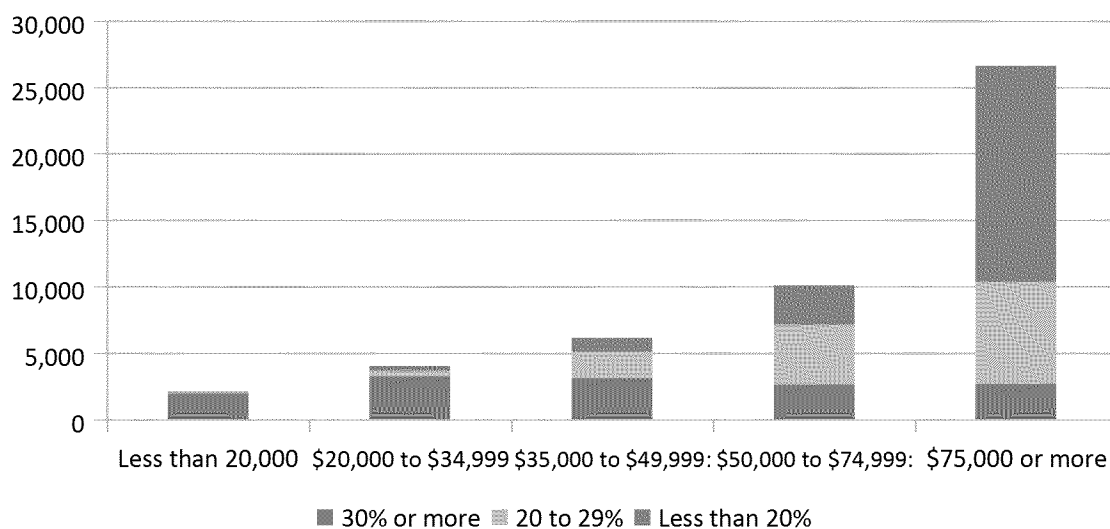
Housing burden by income category, renter-occupied households

Legend: 30% or more · 20 - 29% · Less than 20%
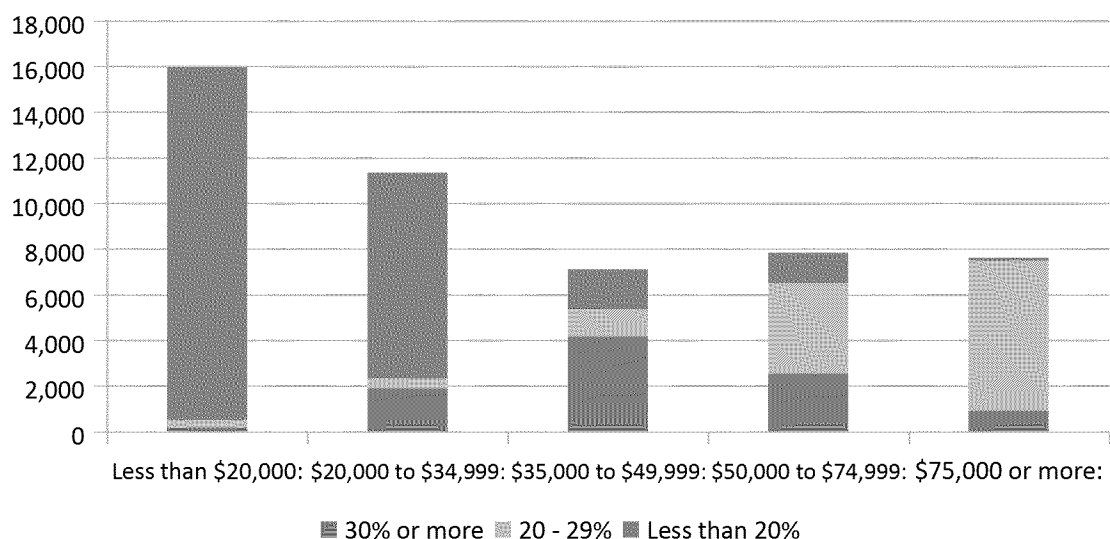
Finally, the graph to the left shows the percentage of owner-occupied and renter-occupied households that pay more than 30% of their income for housing. This graph is a bit misleading for Madison because as shown in the above graphs, there are few households in the lower income categories that own their homes. Those that do seem to pay a high percentage of their income for housing.
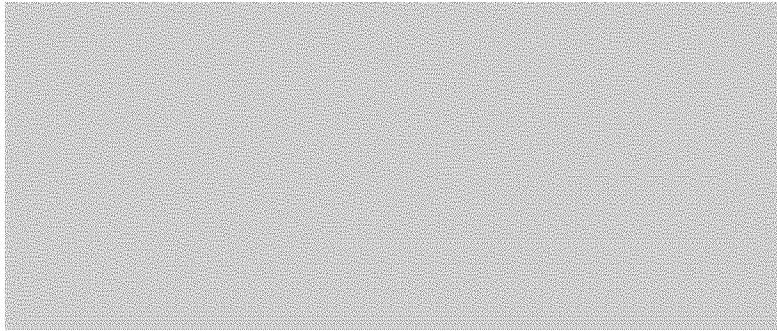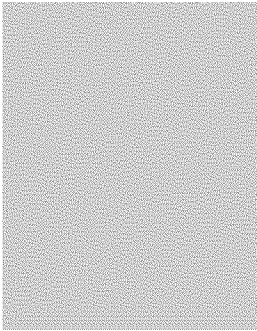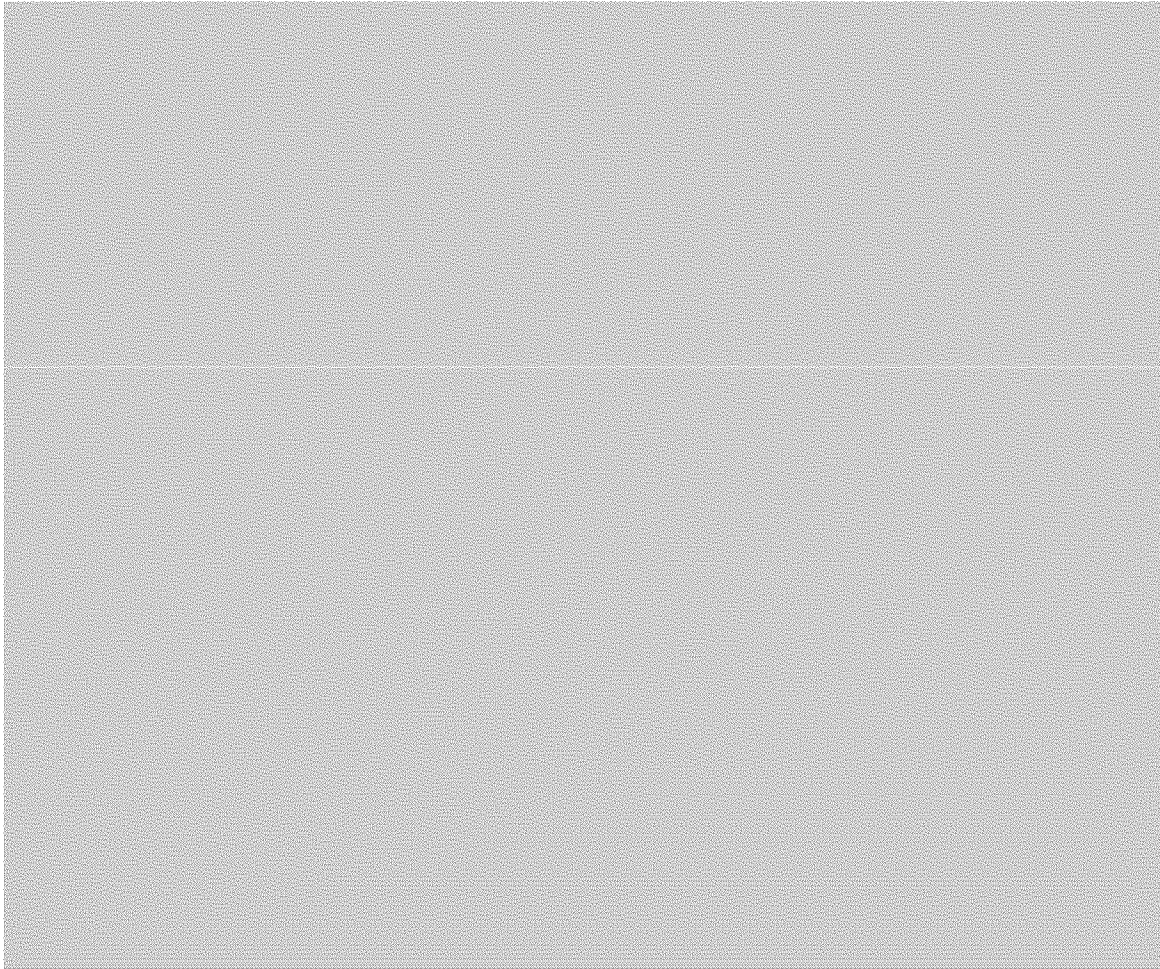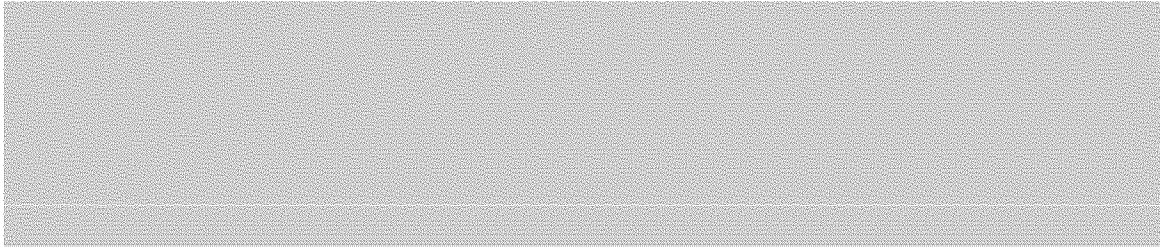
Workbook 4: Developing Alternative Metrics

This workbook provides specific instructions and templates for develping the affordability measures outlined in Specifically, the following spreadsheets are organized as follows:

Affordability metric
Spreadsheet 1: Key Inputs and Data Sources
Spreadsheet 2: Residential indicator (for both wastewater and combined water and wastewater costs), citywid
Spreadsheet 3: Percent increase in Water/WW rates that would make average household WW costs equal to 2
Spreadsheet 4: Percentage of households at different levels of affordability
Spreadsheet 5: Estimated average wastewater bill and total combined bill as a percentage of MHI by income
Spreadsheet 6: Estimated average wastewater bill as a percentage of federal poverty threshold incomes
Spreadsheet 7: Estimated average wastewater bill as a percentage of household income, by household type
Spreadsheet 8: Adjusting income levels for future years
Spreadsheet 9: Percentage of households at different levels of affordability (future years)

Chapter 5 of the Assessment Tool.

e and by Census Tracts

% of MHI, and total water and ww costs equal to 4.5% of MHI

by income category

1. Key Inputs and Data Sources

Average household water and wastewater bill compared to household income levels

annual household water/wastewater bill totaling $750 to develop example affordability metrics. You can use these examples to examine household affordability for your community. Throughout the follwoing spreadsheets, data that will need to be entered by you (i.e., inputs to your analyses), are highlighted in blue. Formulas and metrics that are automatically calculated are highlighted in grey.

	Utility inputs
	Formulas

Average household water and wastewater bills serve as a key input throughout this workbook. To calculate affordability metrics for your community, enter the average annual household water and wastewater bill below and it will automatically be updated throughout the remaining spreadsheets.

Average bills	
Water	$ 300.00
Wastewater	$ 450.00
Combined	$ 750.00

following table describes the specific tables that these data can be drawn from (via American FactFinder). Depending on the size of your community, you will use single-year, three-year average, or five-year-average estimates. For data at the Census-tract level, you will need to use five-year average estimates.

Data	ACS Table
Median Household Income (MHI)	B19013: Median Household Income in the Past 12 Months (in inflation-adjusted
Number of households by income category (16-category distribution)	B19001: Household Income in the Past 12 Months (in inflation-adjusted dollars)
MHI for owner- and renter-occupied households	B25119: Median Household Income in the Past 12 Months (in inflation-adjusted
MHI for elderly households	B19049: Median Household Income in the Past 12 Months (in inflation-adjusted dollars) by Age of Householder
Poverty rates	Months
Poverty threshold incomes	U.S. Census Bureau https://www.census.gov/hhes/www/poverty/data/threshld/index.html

verage annual household water/wastewater bill totaling $750 to develop example
ur community. Throughout the follwoing spreadsheets, data that will need to be entered
automatically calculated are highlighted in grey.

ok. To calculate affordability metrics for your community, enter the average annual
t the remaining spreadsheets.

. The following table describes the specific tables that these data can be drawn from (via
ree-year average, or five-year-average estimates. For data at the Census-tract level, you

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ome in the Past 12 ollars) by Age of
st 12 Months
index.html

1. Residential indicator (for both wastewater and combined water and wastew

Percent increase in water/WW rates that would make average household WW costs equal to 2% of M

Example City:	Philadelphia		
Average wastewater bill	$ 450.00		
Average water bill	$ 300.00		
Average combined water and wastewater bill	$ 750.00		
Large economic impact threshold (WW)	2.0%		
Large economic impact threshold (combined water and WW)	4.5%		

Residential indicators and % increase in average bills that would make WW bills equal to 2% MHI and total bi

Geographic area	2011 MHI	Estimated average annual household wastewater cost as percentage of MHI	Estimated average annual household water and wastewater cost as percentage of MHI	Value of WW bill that would equal 2% of Census-tract MHI
Philadelphia	$34,207	1.32%	2.19%	$684

Residential indicators and % increase in average bills that would make WW bills equal to 2% MHI and total bi

GeoCode	Census tract ID	Census Tract	MHI	Margin of Error
1400000US42101000100	42101000100	Census Tract 1, P	80,813	11,379
1400000US42101000200	42101000200	Census Tract 2, P	37,483	13,839
1400000US42101000300	42101000300	Census Tract 3, P	73,556	11,449
1400000US42101000401	42101000401	Census Tract 4.0:	26,547	6,585
1400000US42101000402	42101000402	Census Tract 4.0:	43,838	10,204
1400000US42101000500	42101000500	Census Tract 5, P	47,039	8,532
1400000US42101000600	42101000600	Census Tract 6, P	56,250	19,779
1400000US42101000700	42101000700	Census Tract 7, P	36,614	11,856
1400000US42101000801	42101000801	Census Tract 8.0:	64,286	30,077
1400000US42101000803	42101000803	Census Tract 8.0:	76,641	30,479
1400000US42101000804	42101000804	Census Tract 8.04	70,762	18,028
1400000US42101000901	42101000901	Census Tract 9.0:	36,181	16,525

1400000US42101000902	42101000902	Census Tract 9.02	21,250	17,877
1400000US42101001001	42101001001	Census Tract 10.0	112,679	37,901
1400000US42101001002	42101001002	Census Tract 10.0	91,319	24,494
1400000US42101001101	42101001101	Census Tract 11.0	50,199	14,200
1400000US42101001102	42101001102	Census Tract 11.0	66,226	19,504
1400000US42101001201	42101001201	Census Tract 12.0	101,081	23,122
1400000US42101001202	42101001202	Census Tract 12.0	60,873	11,170
1400000US42101001300	42101001300	Census Tract 13,	58,341	7,162
1400000US42101001400	42101001400	Census Tract 14,	53,894	23,268
1400000US42101001500	42101001500	Census Tract 15,	75,038	10,173
1400000US42101001600	42101001600	Census Tract 16,	62,425	15,342
1400000US42101001700	42101001700	Census Tract 17,	76,250	13,856
1400000US42101001800	42101001800	Census Tract 18,	70,167	23,153
1400000US42101001900	42101001900	Census Tract 19,	51,232	6,389
1400000US42101002000	42101002000	Census Tract 20,	17,792	8,325
1400000US42101002100	42101002100	Census Tract 21,	31,559	2,558
1400000US42101002200	42101002200	Census Tract 22,	23,173	16,057
1400000US42101002300	42101002300	Census Tract 23,	28,600	10,909
1400000US42101002400	42101002400	Census Tract 24,	39,216	3,562
1400000US42101002500	42101002500	Census Tract 25,	30,257	6,974
1400000US42101002701	42101002701	Census Tract 27.0	28,435	6,228
1400000US42101002702	42101002702	Census Tract 27.0	60,779	6,540
1400000US42101002801	42101002801	Census Tract 28.0	30,699	5,100
1400000US42101002802	42101002802	Census Tract 28.0	42,037	4,099
1400000US42101002900	42101002900	Census Tract 29,	43,418	7,304
1400000US42101003001	42101003001	Census Tract 30.0	35,461	6,538
1400000US42101003002	42101003002	Census Tract 30.0	22,014	4,806
1400000US42101003100	42101003100	Census Tract 31,	21,473	11,294
1400000US42101003200	42101003200	Census Tract 32,	23,159	10,489
1400000US42101003300	42101003300	Census Tract 33,	25,262	4,179
1400000US42101003600	42101003600	Census Tract 36,	18,576	2,622
1400000US42101003701	42101003701	Census Tract 37.0	33,036	6,494
1400000US42101003702	42101003702	Census Tract 37.0	35,236	8,260
1400000US42101003800	42101003800	Census Tract 38,	52,258	10,262
1400000US42101003901	42101003901	Census Tract 39.0	40,326	7,002
1400000US42101003902	42101003902	Census Tract 39.0	55,078	6,758
1400000US42101004001	42101004001	Census Tract 40.0	34,986	6,967
1400000US42101004002	42101004002	Census Tract 40.0	42,520	8,306
1400000US42101004101	42101004101	Census Tract 41.0	22,330	3,166
1400000US42101004102	42101004102	Census Tract 41.0	35,178	4,166
1400000US42101004201	42101004201	Census Tract 42.0	43,477	10,509
1400000US42101004202	42101004202	Census Tract 42.0	37,476	11,617
1400000US42101005000	10100500000%	Census Tract 50, -		**
1400000US42101005400	42101005400	Census Tract 54,	52,016	9,023
1400000US42101005500	42101005500	Census Tract 55,	53,917	8,822

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1400000US42101006300	42101006300	Census Tract 63,	20,788	7,813
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1400000US42101006600	42101006600	Census Tract 66,	26,067	2,273
1400000US42101006700	42101006700	Census Tract 67,	24,519	5,542
1400000US42101006900	42101006900	Census Tract 69,	16,719	8,329
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1400000US42101007101	42101007101	Census Tract 71.(	33,438	13,854
1400000US42101007102	42101007102	Census Tract 71.(	25,320	3,528
1400000US42101007200	42101007200	Census Tract 72,	29,288	5,759
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1400000US42101007400	42101007400	Census Tract 74,	25,433	8,522
1400000US42101007700	42101007700	Census Tract 77,	24,357	8,784
1400000US42101007800	42101007800	Census Tract 78,	38,038	9,792
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1400000US42101008101	42101008101	Census Tract 81.(	29,972	25,707
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1400000US42101008301	42101008301	Census Tract 83.(	25,867	5,360
1400000US42101008302	42101008302	Census Tract 83.(	24,583	6,262
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1400000US42101008500	42101008500	Census Tract 85,	29,839	7,510
1400000US42101008601	42101008601	Census Tract 86.(	45,910	8,852
1400000US42101008602	42101008602	Census Tract 86.(	29,766	6,956
1400000US42101008701	42101008701	Census Tract 87.(	38,444	14,531
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1400000US42101008801	42101008801	Census Tract 88.(	15,518	5,258
1400000US42101008802	42101008802	Census Tract 88.(	12,892	3,829
1400000US42101009000	42101009000	Census Tract 90,	21,912	4,028
1400000US42101009100	42101009100	Census Tract 91,	14,693	3,121
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1400000US42101009300	42101009300	Census Tract 93,	22,326	8,671
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1400000US42101009600	42101009600	Census Tract 96,	26,940	5,434
1400000US42101009801	42101009801	Census Tract 98.(	37,667	15,555
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1400000US42101011000	42101011000	Census Tract 110	24,663	2,988
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1400000US42101011300	42101011300	Census Tract 113	37,996	4,592
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1400000US42101011800	42101011800	Census Tract 118	44,638	8,543
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1400000US42101012100	42101012100	Census Tract 121	34,912	4,536
1400000US42101012201	42101012201	Census Tract 122	16,351	4,955
1400000US42101012203	42101012203	Census Tract 122	21,686	7,286
1400000US42101012204	42101012204	Census Tract 122	43,187	7,810
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1400000US42101013300	42101013300	Census Tract 133	42,733	8,378
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1400000US42101013402	42101013402	Census Tract 134	77,438	7,703
1400000US42101013500	42101013500	Census Tract 135	48,923	8,239
1400000US42101013601	42101013601	Census Tract 136	94,583	20,825
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1400000US42101013700	42101013700	Census Tract 137	20,431	9,291
1400000US42101013800	42101013800	Census Tract 138	23,177	5,251
1400000US42101013900	42101013900	Census Tract 139	14,985	6,491
1400000US42101014000	42101014000	Census Tract 140	19,688	9,394
1400000US42101014100	42101014100	Census Tract 141	14,491	5,788
1400000US42101014200	42101014200	Census Tract 142	67,242	6,989
1400000US42101014300	42101014300	Census Tract 143	62,455	12,241
1400000US42101014400	42101014400	Census Tract 144	28,190	15,942
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1400000US42101014600	42101014600	Census Tract 146	22,411	9,475
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1400000US42101014800	42101014800	Census Tract 148	17,634	11,312
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1400000US42101015101	42101015101	Census Tract 151	18,839	16,856
1400000US42101015102	42101015102	Census Tract 151	12,170	5,503

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1400000US42101015700	42101015700	Census Tract 157	27,043	11,459
1400000US42101015800	42101015800	Census Tract 158	47,326	8,517
1400000US42101016000	42101016000	Census Tract 160	43,886	11,233
1400000US42101016100	42101016100	Census Tract 161	26,524	4,020
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1400000US42101016300	42101016300	Census Tract 163	14,042	3,370
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1400000US42101016500	42101016500	Census Tract 165	14,127	5,245
1400000US42101016600	42101016600	Census Tract 166	22,713	13,303
1400000US42101016701	42101016701	Census Tract 167	20,617	5,010
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1400000US42101016800	42101016800	Census Tract 168	31,621	4,852
1400000US42101016901	42101016901	Census Tract 169	21,711	3,542
1400000US42101016902	42101016902	Census Tract 169	20,909	5,208
1400000US42101017000	42101017000	Census Tract 170	22,410	9,535
1400000US42101017100	42101017100	Census Tract 171	18,800	8,415
1400000US42101017201	42101017201	Census Tract 172	19,531	6,921
1400000US42101017202	42101017202	Census Tract 172	19,161	3,173
1400000US42101017300	42101017300	Census Tract 173	18,090	3,060
1400000US42101017400	42101017400	Census Tract 174	20,868	6,860
1400000US42101017500	42101017500	Census Tract 175	14,972	3,865
1400000US42101017601	42101017601	Census Tract 176	11,122	1,806
1400000US42101017602	42101017602	Census Tract 176	18,741	1,900
1400000US42101017701	42101017701	Census Tract 177	21,393	10,320
1400000US42101017702	42101017702	Census Tract 177	16,356	3,804
1400000US42101017800	42101017800	Census Tract 178	20,093	3,734
1400000US42101017900	42101017900	Census Tract 179	26,652	11,370
1400000US42101018001	42101018001	Census Tract 180	36,121	4,157
1400000US42101018002	42101018002	Census Tract 180	34,124	4,698
1400000US42101018300	42101018300	Census Tract 183	41,338	4,279
1400000US42101018400	42101018400	Census Tract 184	43,036	9,829
1400000US42101018800	42101018800	Census Tract 188	21,672	8,608
1400000US42101019000	42101019000	Census Tract 190	30,488	5,302
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1400000US42101019200	42101019200	Census Tract 192	21,090	8,121
1400000US42101019501	42101019501	Census Tract 195	14,074	2,674
1400000US42101019502	42101019502	Census Tract 195	16,402	6,352
1400000US42101019700	42101019700	Census Tract 197	22,107	5,942
1400000US42101019800	42101019800	Census Tract 198	22,997	2,318
1400000US42101019900	42101019900	Census Tract 199	18,557	2,600
1400000US42101020000	42101020000	Census Tract 200	31,620	11,473
1400000US42101020101	42101020101	Census Tract 201	26,144	8,008

1400000US42101020102	42101020102	Census Tract 201	31,425	2,617
1400000US42101020200	42101020200	Census Tract 202	21,521	3,565
1400000US42101020300	42101020300	Census Tract 203	26,773	4,999
1400000US42101020400	42101020400	Census Tract 204	31,294	3,924
1400000US42101020500	42101020500	Census Tract 205	20,693	5,656
1400000US42101020600	42101020600	Census Tract 206	45,192	23,052
1400000US42101020700	42101020700	Census Tract 207	74,076	6,708
1400000US42101020800	42101020800	Census Tract 208	37,069	6,351
1400000US42101020900	42101020900	Census Tract 209	63,090	25,416
1400000US42101021000	42101021000	Census Tract 210	60,063	14,047
1400000US42101021100	42101021100	Census Tract 211	61,318	5,505
1400000US42101021200	42101021200	Census Tract 212	61,181	9,976
1400000US42101021300	42101021300	Census Tract 213	56,949	4,486
1400000US42101021400	42101021400	Census Tract 214	57,010	5,498
1400000US42101021500	42101021500	Census Tract 215	60,263	8,393
1400000US42101021600	42101021600	Census Tract 216	38,472	15,316
1400000US42101021700	42101021700	Census Tract 217	66,463	6,915
1400000US42101021800	42101021800	Census Tract 218	52,857	7,132
1400000US42101021900	42101021900	Census Tract 219	77,612	15,312
1400000US42101022000	42101022000	Census Tract 220	105,260	37,797
1400000US42101023100	42101023100	Census Tract 231	106,638	33,989
1400000US42101023500	42101023500	Census Tract 235	74,881	16,290
1400000US42101023600	42101023600	Census Tract 236	74,810	24,953
1400000US42101023700	42101023700	Census Tract 237	40,256	8,997
1400000US42101023800	42101023800	Census Tract 238	34,744	5,710
1400000US42101023900	42101023900	Census Tract 239	29,314	6,563
1400000US42101024000	42101024000	Census Tract 240	33,417	9,856
1400000US42101024100	42101024100	Census Tract 241	11,230	3,044
1400000US42101024200	42101024200	Census Tract 242	25,449	6,450
1400000US42101024300	42101024300	Census Tract 243	34,671	5,260
1400000US42101024400	42101024400	Census Tract 244	33,878	8,991
1400000US42101024500	42101024500	Census Tract 245	26,356	7,530
1400000US42101024600	42101024600	Census Tract 246	18,881	4,109
1400000US42101024700	42101024700	Census Tract 247	25,047	5,947
1400000US42101024800	42101024800	Census Tract 248	36,433	10,256
1400000US42101024900	42101024900	Census Tract 249	36,667	13,832
1400000US42101025200	42101025200	Census Tract 252	35,021	7,266
1400000US42101025300	42101025300	Census Tract 253	29,146	8,869
1400000US42101025400	42101025400	Census Tract 254	54,250	6,621
1400000US42101025500	42101025500	Census Tract 255	62,118	20,099
1400000US42101025600	42101025600	Census Tract 256	66,116	7,260
1400000US42101025700	42101025700	Census Tract 257	66,774	8,973
1400000US42101025800	42101025800	Census Tract 258	52,900	16,501
1400000US42101025900	42101025900	Census Tract 259	40,633	9,465
1400000US42101026000	42101026000	Census Tract 260	49,861	13,091

1400000US42101026100	42101026100	Census Tract 261	57,977	7,210
1400000US42101026200	42101026200	Census Tract 262	45,242	6,019
1400000US42101026301	42101026301	Census Tract 263	46,953	7,482
1400000US42101026302	42101026302	Census Tract 263	42,513	6,421
1400000US42101026400	42101026400	Census Tract 264	42,917	9,227
1400000US42101026500	42101026500	Census Tract 265	45,906	5,642
1400000US42101026600	42101026600	Census Tract 266	42,785	6,878
1400000US42101026700	42101026700	Census Tract 267	37,941	6,845
1400000US42101026800	42101026800	Census Tract 268	33,513	6,823
1400000US42101026900	42101026900	Census Tract 269	46,786	24,096
1400000US42101027000	42101027000	Census Tract 270	51,328	16,042
1400000US42101027100	42101027100	Census Tract 271	44,750	9,932
1400000US42101027200	42101027200	Census Tract 272	48,048	5,936
1400000US42101027300	42101027300	Census Tract 273	43,005	5,999
1400000US42101027401	42101027401	Census Tract 274	23,345	4,916
1400000US42101027402	42101027402	Census Tract 274	33,688	3,746
1400000US42101027500	42101027500	Census Tract 275	42,938	11,693
1400000US42101027600	42101027600	Census Tract 276	28,802	6,795
1400000US42101027700	42101027700	Census Tract 277	25,690	7,650
1400000US42101027800	42101027800	Census Tract 278	30,647	6,639
1400000US42101027901	42101027901	Census Tract 279	28,984	6,914
1400000US42101027902	42101027902	Census Tract 279	31,701	6,432
1400000US42101028000	42101028000	Census Tract 280	25,267	4,887
1400000US42101028100	42101028100	Census Tract 281	32,601	10,182
1400000US42101028200	42101028200	Census Tract 282	34,890	5,621
1400000US42101028300	42101028300	Census Tract 283	27,396	7,359
1400000US42101028400	42101028400	Census Tract 284	28,362	10,918
1400000US42101028500	42101028500	Census Tract 285	30,570	16,323
1400000US42101028600	42101028600	Census Tract 286	31,413	9,232
1400000US42101028700	42101028700	Census Tract 287	16,944	8,747
1400000US42101028800	42101028800	Census Tract 288	25,121	3,646
1400000US42101028901	42101028901	Census Tract 289	30,150	2,953
1400000US42101028902	42101028902	Census Tract 289	34,379	8,225
1400000US42101029000	42101029000	Census Tract 290	29,521	5,405
1400000US42101029100	42101029100	Census Tract 291	24,514	4,530
1400000US42101029200	42101029200	Census Tract 292	31,155	5,383
1400000US42101029300	42101029300	Census Tract 293	25,227	7,718
1400000US42101029400	42101029400	Census Tract 294	20,500	7,224
1400000US42101029800	42101029800	Census Tract 298	23,777	6,861
1400000US42101029900	42101029900	Census Tract 299	24,552	4,578
1400000US42101030000	42101030000	Census Tract 300	27,772	5,558
1400000US42101030100	42101030100	Census Tract 301	36,021	11,087
1400000US42101030200	42101030200	Census Tract 302	33,601	4,521
1400000US42101030501	42101030501	Census Tract 305	35,815	6,124
1400000US42101030502	42101030502	Census Tract 305	44,318	9,668

1400000US42101030600	42101030600	Census Tract 306	33,737	6,038
1400000US42101030700	42101030700	Census Tract 307	46,649	9,576
1400000US42101030800	42101030800	Census Tract 308	55,949	5,430
1400000US42101030900	42101030900	Census Tract 309	38,462	6,682
1400000US42101031000	42101031000	Census Tract 310	55,016	10,157
1400000US42101031101	42101031101	Census Tract 311	33,537	4,834
1400000US42101031102	42101031102	Census Tract 311	26,990	6,009
1400000US42101031200	42101031200	Census Tract 312	40,132	15,877
1400000US42101031300	42101031300	Census Tract 313	31,789	5,586
1400000US42101031401	42101031401	Census Tract 314	47,801	7,248
1400000US42101031402	42101031402	Census Tract 314	43,549	10,496
1400000US42101031501	42101031501	Census Tract 315	53,633	7,647
1400000US42101031502	42101031502	Census Tract 315	51,321	8,178
1400000US42101031600	42101031600	Census Tract 316	41,788	9,308
1400000US42101031700	42101031700	Census Tract 317	43,393	12,162
1400000US42101031800	42101031800	Census Tract 318	38,782	7,136
1400000US42101031900	42101031900	Census Tract 319	40,536	7,797
1400000US42101032000	42101032000	Census Tract 320	40,969	4,176
1400000US42101032100	42101032100	Census Tract 321	32,933	2,972
1400000US42101032300	42101032300	Census Tract 323	33,036	7,731
1400000US42101032500	42101032500	Census Tract 325	35,922	3,965
1400000US42101032600	42101032600	Census Tract 326	36,416	7,040
1400000US42101032900	42101032900	Census Tract 329	32,717	9,073
1400000US42101033000	42101033000	Census Tract 330	38,062	3,698
1400000US42101033101	42101033101	Census Tract 331	53,350	5,839
1400000US42101033102	42101033102	Census Tract 331	46,523	5,561
1400000US42101033200	42101033200	Census Tract 332	54,292	11,595
1400000US42101033300	42101033300	Census Tract 333	43,018	6,493
1400000US42101033400	42101033400	Census Tract 334	41,214	5,145
1400000US42101033500	42101033500	Census Tract 335	50,339	5,989
1400000US42101033600	42101033600	Census Tract 336	53,342	7,566
1400000US42101033701	42101033701	Census Tract 337	26,354	4,964
1400000US42101033702	42101033702	Census Tract 337	54,485	9,229
1400000US42101033800	42101033800	Census Tract 338	44,865	7,983
1400000US42101033900	42101033900	Census Tract 339	48,088	12,566
1400000US42101034000	42101034000	Census Tract 340	60,875	9,208
1400000US42101034100	42101034100	Census Tract 341	51,125	5,174
1400000US42101034200	42101034200	Census Tract 342	52,841	11,085
1400000US42101034400	42101034400	Census Tract 344	81,481	11,073
1400000US42101034501	42101034501	Census Tract 345	25,271	3,602
1400000US42101034502	42101034502	Census Tract 345	41,719	4,681
1400000US42101034600	42101034600	Census Tract 346	32,404	3,868
1400000US42101034701	42101034701	Census Tract 347	51,750	7,316
1400000US42101034702	42101034702	Census Tract 347	73,266	6,380
1400000US42101034801	42101034801	Census Tract 348	42,853	3,624

1400000US42101034802	42101034802	Census Tract 348	47,818	6,289
1400000US42101034803	42101034803	Census Tract 348	59,031	8,470
1400000US42101034900	42101034900	Census Tract 349	34,216	7,209
1400000US42101035100	42101035100	Census Tract 351	43,323	9,627
1400000US42101035200	42101035200	Census Tract 352	72,987	12,720
1400000US42101035301	42101035301	Census Tract 353	70,305	4,913
1400000US42101035302	42101035302	Census Tract 353	56,829	5,383
1400000US42101035500	42101035500	Census Tract 355	53,977	4,328
1400000US42101035601	42101035601	Census Tract 356	45,089	16,548
1400000US42101035602	42101035602	Census Tract 356	68,333	11,537
1400000US42101035701	42101035701	Census Tract 357	39,047	6,658
1400000US42101035702	42101035702	Census Tract 357	43,281	11,290
1400000US42101035800	42101035800	Census Tract 358	66,618	17,398
1400000US42101035900	42101035900	Census Tract 359	53,717	6,884
1400000US42101036000	42101036000	Census Tract 360	58,355	9,869
1400000US42101036100	42101036100	Census Tract 361	54,008	9,379
1400000US42101036201	42101036201	Census Tract 362	52,611	6,176
1400000US42101036202	42101036202	Census Tract 362	66,029	8,837
1400000US42101036203	42101036203	Census Tract 362	51,222	11,673
1400000US42101036301	42101036301	Census Tract 363	54,817	15,525
1400000US42101036302	42101036302	Census Tract 363	66,215	10,683
1400000US42101036303	42101036303	Census Tract 363	62,161	5,667
1400000US42101036400	42101036400	Census Tract 364	44,063	208,421
1400000US42101036501	42101036501	Census Tract 365	49,798	16,309
1400000US42101036502	42101036502	Census Tract 365	78,750	23,449
1400000US42101036600	42101036600	Census Tract 366	131,848	24,720
1400000US42101036700	42101036700	Census Tract 367	77,060	10,434
1400000US42101036900	42101036900	Census Tract 369	48,144	30,115
1400000US42101037200	42101037200	Census Tract 372	44,313	6,417
1400000US42101037300	42101037300	Census Tract 373	48,163	7,021
1400000US42101037500	42101037500	Census Tract 375	72,063	16,997
1400000US42101037600	42101037600	Census Tract 376	56,350	7,799
1400000US42101037700	42101037700	Census Tract 377	14,838	3,834
1400000US42101037800	42101037800	Census Tract 378	34,179	8,599
1400000US42101037900	42101037900	Census Tract 379	34,464	8,657
1400000US42101038000	42101038000	Census Tract 380	39,500	15,698
1400000US42101038100	42101038100	Census Tract 381	21,667	8,579
1400000US42101038200	42101038200	Census Tract 382	26,005	5,540
1400000US42101038300	42101038300	Census Tract 383	23,125	9,397
1400000US42101038400	42101038400	Census Tract 384	69,000	16,406
1400000US42101038500	42101038500	Census Tract 385	86,915	2,716
1400000US42101038600	42101038600	Census Tract 386	68,984	35,969
1400000US42101038700	42101038700	Census Tract 387	94,444	18,427
1400000US42101038800	42101038800	Census Tract 388	78,411	11,735
1400000US42101038900	42101038900	Census Tract 389	46,081	8,956

1400000US42101039000	42101039000	Census Tract 390	31,961	5,194
1400000US42101980000	42101980000	Census Tract 980	16,500	27,112
1400000US42101980100	42101980100	Census Tract 980	47,857	49,831
1400000US42101980200	42101980200	Census Tract 980	143,889	57,204
1400000US42101980300	42101980300	Census Tract 980-		**
1400000US42101980400	42101980400	Census Tract 980-		**
1400000US42101980500	42101980500	Census Tract 980-		**
1400000US42101980600	42101980600	Census Tract 980-		**
1400000US42101980700	42101980700	Census Tract 980-		**
1400000US42101980800	42101980800	Census Tract 980-		**
1400000US42101980900	42101980900	Census Tract 980-		**
1400000US42101989100	42101989100	Census Tract 989-		**

lls equal to 4.5% of MHI, citywide

% increase that would make average WW bill equal to 2% of MHI	Average combined bill as % of Census-tract MHI	Value of total bill that would equal 2% of Census-tract MHI	% increase that would make average total bill equal to 4.5% of MHI
52.0%	2.19%	$1,539	105.2%

lls equal to 4.5% of MHI, by Census Tract

Coefficient of variance	Average WW bill as % of MHI	Value of WW bill that would equal 2% of CT MHI)	% increase that would make average WW bill equal to 2% of MHI	Average combined bill as % of CT MHI	Value of total bill that would equal 2% of CT MHI)
14.1%	0.56%	$1,616	259.2%	0.9%	$3,637
36.9%	1.20%	$750	66.6%	2.0%	$1,687
15.6%	0.61%	$1,471	226.9%	1.0%	$3,310
24.8%	1.70%	$531	18.0%	2.8%	$1,195
23.3%	1.03%	$877	94.8%	1.7%	$1,973
18.1%	0.96%	$941	109.1%	1.6%	$2,117
35.2%	0.80%	$1,125	150.0%	1.3%	$2,531
32.4%	1.23%	$732	62.7%	2.0%	$1,648
46.8%	0.70%	$1,286	185.7%	1.2%	$2,893
39.8%	0.59%	$1,533	240.6%	1.0%	$3,449
25.5%	0.64%	$1,415	214.5%	1.1%	$3,184
45.7%	1.24%	$724	60.8%	2.1%	$1,628

84.1%	2.12%	$425	NA	3.5%	$956
33.6%	0.40%	$2,254	400.8%	0.7%	$5,071
26.8%	0.49%	$1,826	305.9%	0.8%	$4,109
28.3%	0.90%	$1,004	123.1%	1.5%	$2,259
29.5%	0.68%	$1,325	194.3%	1.1%	$2,980
22.9%	0.45%	$2,022	349.2%	0.7%	$4,549
18.3%	0.74%	$1,217	170.5%	1.2%	$2,739
12.3%	0.77%	$1,167	159.3%	1.3%	$2,625
43.2%	0.83%	$1,078	139.5%	1.4%	$2,425
13.6%	0.60%	$1,501	233.5%	1.0%	$3,377
24.6%	0.72%	$1,249	177.4%	1.2%	$2,809
18.2%	0.59%	$1,525	238.9%	1.0%	$3,431
33.0%	0.64%	$1,403	211.9%	1.1%	$3,158
12.5%	0.88%	$1,025	127.7%	1.5%	$2,305
46.8%	2.53%	$356	NA	4.2%	$801
8.1%	1.43%	$631	40.3%	2.4%	$1,420
69.3%	1.94%	$463	3.0%	3.2%	$1,043
38.1%	1.57%	$572	27.1%	2.6%	$1,287
9.1%	1.15%	$784	74.3%	1.9%	$1,765
23.0%	1.49%	$605	34.5%	2.5%	$1,362
21.9%	1.58%	$569	26.4%	2.6%	$1,280
10.8%	0.74%	$1,216	170.1%	1.2%	$2,735
16.6%	1.47%	$614	36.4%	2.4%	$1,381
9.8%	1.07%	$841	86.8%	1.8%	$1,892
16.8%	1.04%	$868	93.0%	1.7%	$1,954
18.4%	1.27%	$709	57.6%	2.1%	$1,596
21.8%	2.04%	$440	NA	3.4%	$991
52.6%	2.10%	$429	NA	3.5%	$966
45.3%	1.94%	$463	2.9%	3.2%	$1,042
16.5%	1.78%	$505	12.3%	3.0%	$1,137
14.1%	2.42%	$372	NA	4.0%	$836
19.7%	1.36%	$661	46.8%	2.3%	$1,487
23.4%	1.28%	$705	56.6%	2.1%	$1,586
19.6%	0.86%	$1,045	132.3%	1.4%	$2,352
17.4%	1.12%	$807	79.2%	1.9%	$1,815
12.3%	0.82%	$1,102	144.8%	1.4%	$2,479
19.9%	1.29%	$700	55.5%	2.1%	$1,574
19.5%	1.06%	$850	89.0%	1.8%	$1,913
14.2%	2.02%	$447	NA	3.4%	$1,005
11.8%	1.28%	$704	56.3%	2.1%	$1,583
24.2%	1.04%	$870	93.2%	1.7%	$1,956
31.0%	1.20%	$750	66.6%	2.0%	$1,686
#VALUE!	#VALUE!	#VALUE!		#VALUE!	#VALUE!	#VALUE!
17.3%	0.87%	$1,040	131.2%	1.4%	$2,341
16.4%	0.83%	$1,078	139.6%	1.4%	$2,426

107.1%	1.29%	$698	55.0%	2.2%	$1,570
15.2%	1.05%	$855	89.9%	1.8%	$1,923
35.7%	1.07%	$841	86.8%	1.8%	$1,892
16.7%	1.39%	$648	44.1%	2.3%	$1,459
37.6%	2.16%	$416	NA	3.6%	$935
22.8%	1.45%	$620	37.7%	2.4%	$1,394
26.9%	1.75%	$513	14.0%	2.9%	$1,155
8.7%	1.73%	$521	15.9%	2.9%	$1,173
22.6%	1.84%	$490	9.0%	3.1%	$1,103
49.8%	2.69%	$334	NA	4.5%	$752
16.2%	1.46%	$614	36.5%	2.4%	$1,382
41.4%	1.35%	$669	48.6%	2.2%	$1,505
13.9%	1.78%	$506	12.5%	3.0%	$1,139
19.7%	1.54%	$586	30.2%	2.6%	$1,318
29.8%	1.47%	$611	35.8%	2.5%	$1,375
33.5%	1.77%	$509	13.0%	2.9%	$1,144
36.1%	1.85%	$487	8.3%	3.1%	$1,096
25.7%	1.18%	$761	69.1%	2.0%	$1,712
12.9%	1.08%	$835	85.5%	1.8%	$1,878
43.6%	1.37%	$657	45.9%	2.3%	$1,477
85.8%	1.50%	$599	33.2%	2.5%	$1,349
11.8%	1.44%	$625	39.0%	2.4%	$1,407
20.7%	1.12%	$803	78.3%	1.9%	$1,806
20.7%	1.74%	$517	15.0%	2.9%	$1,164
25.5%	1.83%	$492	9.3%	3.1%	$1,106
16.7%	1.70%	$528	17.3%	2.8%	$1,188
25.2%	1.51%	$597	32.6%	2.5%	$1,343
19.3%	0.98%	$918	104.0%	1.6%	$2,066
23.4%	1.51%	$595	32.3%	2.5%	$1,339
37.8%	1.17%	$769	70.9%	2.0%	$1,730
19.3%	1.48%	$610	35.5%	2.5%	$1,372
33.9%	2.90%	$310	NA	4.8%	$698
29.7%	3.49%	$258	NA	5.8%	$580
18.4%	2.05%	$438	NA	3.4%	$986
21.2%	3.06%	$294	NA	5.1%	$661
47.2%	1.93%	$467	3.8%	3.2%	$1,051
38.8%	2.02%	$447	NA	3.4%	$1,005
13.8%	2.27%	$396	NA	3.8%	$891
16.1%	2.68%	$336	NA	4.5%	$755
20.2%	1.67%	$539	19.7%	2.8%	$1,212
41.3%	1.19%	$753	67.4%	2.0%	$1,695
15.4%	0.93%	$968	115.1%	1.5%	$2,178
14.4%	1.11%	$811	80.2%	1.9%	$1,824
50.4%	1.97%	$456	1.4%	3.3%	$1,027
28.3%	2.41%	$373	NA	4.0%	$840

19.9%	1.90%	$473	5.2%	3.2%	$1,065
39.4%	1.35%	$667	48.1%	2.3%	$1,500
22.2%	2.46%	$366	NA	4.1%	$823
75.4%	1.85%	$488	8.3%	3.1%	$1,097
24.0%	2.40%	$375	NA	4.0%	$843
21.2%	2.43%	$370	NA	4.1%	$833
28.6%	2.40%	$376	NA	4.0%	$845
12.1%	1.82%	$493	9.6%	3.0%	$1,110
28.7%	2.39%	$377	NA	4.0%	$848
21.6%	1.83%	$491	9.1%	3.1%	$1,105
12.1%	1.18%	$760	68.9%	2.0%	$1,710
31.1%	1.54%	$586	30.2%	2.6%	$1,318
14.6%	0.90%	$995	121.0%	1.5%	$2,238
74.6%	0.73%	$1,240	175.6%	1.2%	$2,790
19.1%	1.01%	$893	98.4%	1.7%	$2,009
9.9%	1.27%	$708	57.4%	2.1%	$1,593
48.9%	1.36%	$664	47.5%	2.3%	$1,494
13.0%	1.29%	$698	55.2%	2.1%	$1,571
30.3%	2.75%	$327	NA	4.6%	$736
33.6%	2.08%	$434	NA	3.5%	$976
18.1%	1.04%	$864	91.9%	1.7%	$1,943
14.5%	0.86%	$1,044	132.0%	1.4%	$2,349
41.8%	1.84%	$490	9.0%	3.1%	$1,103
27.8%	2.59%	$347	NA	4.3%	$780
19.6%	1.05%	$855	89.9%	1.8%	$1,923
28.2%	0.72%	$1,247	177.2%	1.2%	$2,807
9.9%	0.58%	$1,549	244.2%	1.0%	$3,485
16.8%	0.92%	$978	117.4%	1.5%	$2,202
22.0%	0.48%	$1,892	320.4%	0.8%	$4,256
26.8%	0.61%	$1,471	227.0%	1.0%	$3,311
45.5%	2.20%	$409	NA	3.7%	$919
22.7%	1.94%	$464	3.0%	3.2%	$1,043
43.3%	3.00%	$300	NA	5.0%	$674
47.7%	2.29%	$394	NA	3.8%	$886
39.9%	3.11%	$290	NA	5.2%	$652
10.4%	0.67%	$1,345	198.9%	1.1%	$3,026
19.6%	0.72%	$1,249	177.6%	1.2%	$2,810
56.6%	1.60%	$564	25.3%	2.7%	$1,269
30.2%	3.26%	$276	NA	5.4%	$621
42.3%	2.01%	$448	NA	3.3%	$1,008
49.4%	3.86%	$233	NA	6.4%	$525
64.1%	2.55%	$353	NA	4.3%	$794
48.6%	2.72%	$331	NA	4.5%	$744
89.5%	2.39%	$377	NA	4.0%	$848
45.2%	3.70%	$243	NA	6.2%	$548

24.6%	3.39%	$265	NA	5.7%	$597
46.1%	3.25%	$277	NA	5.4%	$623
89.8%	2.66%	$338	NA	4.4%	$761
42.4%	1.66%	$541	20.2%	2.8%	$1,217
18.0%	0.95%	$947	110.3%	1.6%	$2,130
25.6%	1.03%	$878	95.0%	1.7%	$1,975
15.2%	1.70%	$530	17.9%	2.8%	$1,194
61.8%	2.81%	$320	NA	4.7%	$721
24.0%	3.20%	$281	NA	5.3%	$632
30.7%	3.33%	$270	NA	5.6%	$608
37.1%	3.19%	$283	NA	5.3%	$636
58.6%	1.98%	$454	0.9%	3.3%	$1,022
24.3%	2.18%	$412	NA	3.6%	$928
32.5%	2.50%	$360	NA	4.2%	$810
15.3%	1.42%	$632	40.5%	2.4%	$1,423
16.3%	2.07%	$434	NA	3.5%	$977
24.9%	2.15%	$418	NA	3.6%	$941
42.5%	2.01%	$448	NA	3.3%	$1,008
44.8%	2.39%	$376	NA	4.0%	$846
35.4%	2.30%	$391	NA	3.8%	$879
16.6%	2.35%	$383	NA	3.9%	$862
16.9%	2.49%	$362	NA	4.1%	$814
32.9%	2.16%	$417	NA	3.6%	$939
25.8%	3.01%	$299	NA	5.0%	$674
16.2%	4.05%	$222	NA	6.7%	$500
10.1%	2.40%	$375	NA	4.0%	$843
48.2%	2.10%	$428	NA	3.5%	$963
23.3%	2.75%	$327	NA	4.6%	$736
18.6%	2.24%	$402	NA	3.7%	$904
42.7%	1.69%	$533	18.5%	2.8%	$1,199
11.5%	1.25%	$722	60.5%	2.1%	$1,625
13.8%	1.32%	$682	51.7%	2.2%	$1,536
10.4%	1.09%	$827	83.7%	1.8%	$1,860
22.8%	1.05%	$861	91.3%	1.7%	$1,937
39.7%	2.08%	$433	NA	3.5%	$975
17.4%	1.48%	$610	35.5%	2.5%	$1,372
23.7%	1.59%	$567	26.1%	2.6%	$1,276
38.5%	2.13%	$422	NA	3.6%	$949
19.0%	3.20%	$281	NA	5.3%	$633
38.7%	2.74%	$328	NA	4.6%	$738
26.9%	2.04%	$442	NA	3.4%	$995
10.1%	1.96%	$460	2.2%	3.3%	$1,035
14.0%	2.42%	$371	NA	4.0%	$835
36.3%	1.42%	$632	40.5%	2.4%	$1,423
30.6%	1.72%	$523	16.2%	2.9%	$1,176

8.3%	1.43%	$629	39.7%	2.4%	$1,414
16.6%	2.09%	$430	NA	3.5%	$968
18.7%	1.68%	$535	19.0%	2.8%	$1,205
12.5%	1.44%	$626	39.1%	2.4%	$1,408
27.3%	2.17%	$414	NA	3.6%	$931
51.0%	1.00%	$904	100.9%	1.7%	$2,034
9.1%	0.61%	$1,482	229.2%	1.0%	$3,333
17.1%	1.21%	$741	64.8%	2.0%	$1,668
40.3%	0.71%	$1,262	180.4%	1.2%	$2,839
23.4%	0.75%	$1,201	166.9%	1.2%	$2,703
9.0%	0.73%	$1,226	172.5%	1.2%	$2,759
16.3%	0.74%	$1,224	171.9%	1.2%	$2,753
7.9%	0.79%	$1,139	153.1%	1.3%	$2,563
9.6%	0.79%	$1,140	153.4%	1.3%	$2,565
13.9%	0.75%	$1,205	167.8%	1.2%	$2,712
39.8%	1.17%	$769	71.0%	1.9%	$1,731
10.4%	0.68%	$1,329	195.4%	1.1%	$2,991
13.5%	0.85%	$1,057	134.9%	1.4%	$2,379
19.7%	0.58%	$1,552	244.9%	1.0%	$3,493
35.9%	0.43%	$2,105	367.8%	0.7%	$4,737
31.9%	0.42%	$2,133	373.9%	0.7%	$4,799
21.8%	0.60%	$1,498	232.8%	1.0%	$3,370
33.4%	0.60%	$1,496	232.5%	1.0%	$3,366
22.3%	1.12%	$805	78.9%	1.9%	$1,812
16.4%	1.30%	$695	54.4%	2.2%	$1,563
22.4%	1.54%	$586	30.3%	2.6%	$1,319
29.5%	1.35%	$668	48.5%	2.2%	$1,504
27.1%	4.01%	$225	NA	6.7%	$505
25.3%	1.77%	$509	13.1%	2.9%	$1,145
15.2%	1.30%	$693	54.1%	2.2%	$1,560
26.5%	1.33%	$678	50.6%	2.2%	$1,525
28.6%	1.71%	$527	17.1%	2.8%	$1,186
21.8%	2.38%	$378	NA	4.0%	$850
23.7%	1.80%	$501	11.3%	3.0%	$1,127
28.2%	1.24%	$729	61.9%	2.1%	$1,639
37.7%	1.23%	$733	63.0%	2.0%	$1,650
20.7%	1.28%	$700	55.6%	2.1%	$1,576
30.4%	1.54%	$583	29.5%	2.6%	$1,312
12.2%	0.83%	$1,085	141.1%	1.4%	$2,441
32.4%	0.72%	$1,242	176.1%	1.2%	$2,795
11.0%	0.68%	$1,322	193.8%	1.1%	$2,975
13.4%	0.67%	$1,335	196.8%	1.1%	$3,005
31.2%	0.85%	$1,058	135.1%	1.4%	$2,381
23.3%	1.11%	$813	80.6%	1.8%	$1,828
26.3%	0.90%	$997	121.6%	1.5%	$2,244

12.4%	0.78%	$1,160	157.7%	1.3%	$2,609
13.3%	0.99%	$905	101.1%	1.7%	$2,036
15.9%	0.96%	$939	108.7%	1.6%	$2,113
15.1%	1.06%	$850	88.9%	1.8%	$1,913
21.5%	1.05%	$858	90.7%	1.7%	$1,931
12.3%	0.98%	$918	104.0%	1.6%	$2,066
16.1%	1.05%	$856	90.2%	1.8%	$1,925
18.0%	1.19%	$759	68.6%	2.0%	$1,707
20.4%	1.34%	$670	48.9%	2.2%	$1,508
51.5%	0.96%	$936	107.9%	1.6%	$2,105
31.3%	0.88%	$1,027	128.1%	1.5%	$2,310
22.2%	1.01%	$895	98.9%	1.7%	$2,014
12.4%	0.94%	$961	113.5%	1.6%	$2,162
13.9%	1.05%	$860	91.1%	1.7%	$1,935
21.1%	1.93%	$467	3.8%	3.2%	$1,051
11.1%	1.34%	$674	49.7%	2.2%	$1,516
27.2%	1.05%	$859	90.8%	1.7%	$1,932
23.6%	1.56%	$576	28.0%	2.6%	$1,296
29.8%	1.75%	$514	14.2%	2.9%	$1,156
21.7%	1.47%	$613	36.2%	2.4%	$1,379
23.9%	1.55%	$580	28.8%	2.6%	$1,304
20.3%	1.42%	$634	40.9%	2.4%	$1,427
19.3%	1.78%	$505	12.3%	3.0%	$1,137
31.2%	1.38%	$652	44.9%	2.3%	$1,467
16.1%	1.29%	$698	55.1%	2.1%	$1,570
26.9%	1.64%	$548	21.8%	2.7%	$1,233
38.5%	1.59%	$567	26.1%	2.6%	$1,276
53.4%	1.47%	$611	35.9%	2.5%	$1,376
29.4%	1.43%	$628	39.6%	2.4%	$1,414
51.6%	2.66%	$339	NA	4.4%	$762
14.5%	1.79%	$502	11.6%	3.0%	$1,130
9.8%	1.49%	$603	34.0%	2.5%	$1,357
23.9%	1.31%	$688	52.8%	2.2%	$1,547
18.3%	1.52%	$590	31.2%	2.5%	$1,328
18.5%	1.84%	$490	9.0%	3.1%	$1,103
17.3%	1.44%	$623	38.5%	2.4%	$1,402
30.6%	1.78%	$505	12.1%	3.0%	$1,135
35.2%	2.20%	$410	NA	3.7%	$923
28.9%	1.89%	$476	5.7%	3.2%	$1,070
18.6%	1.83%	$491	9.1%	3.1%	$1,105
20.0%	1.62%	$555	23.4%	2.7%	$1,250
30.8%	1.25%	$720	60.1%	2.1%	$1,621
13.5%	1.34%	$672	49.3%	2.2%	$1,512
17.1%	1.26%	$716	59.2%	2.1%	$1,612
21.8%	1.02%	$886	97.0%	1.7%	$1,994

17.9%	1.33%	$675	49.9%	2.2%	$1,518
20.5%	0.96%	$933	107.3%	1.6%	$2,099
9.7%	0.80%	$1,119	148.7%	1.3%	$2,518
17.4%	1.17%	$769	70.9%	1.9%	$1,731
18.5%	0.82%	$1,100	144.5%	1.4%	$2,476
14.4%	1.34%	$671	49.1%	2.2%	$1,509
22.3%	1.67%	$540	20.0%	2.8%	$1,215
39.6%	1.12%	$803	78.4%	1.9%	$1,806
17.6%	1.42%	$636	41.3%	2.4%	$1,431
15.2%	0.94%	$956	112.4%	1.6%	$2,151
24.1%	1.03%	$871	93.6%	1.7%	$1,960
14.3%	0.84%	$1,073	138.4%	1.4%	$2,413
15.9%	0.88%	$1,026	128.1%	1.5%	$2,309
22.3%	1.08%	$836	85.7%	1.8%	$1,880
28.0%	1.04%	$868	92.9%	1.7%	$1,953
18.4%	1.16%	$776	72.4%	1.9%	$1,745
19.2%	1.11%	$811	80.2%	1.9%	$1,824
10.2%	1.10%	$819	82.1%	1.8%	$1,844
9.0%	1.37%	$659	46.4%	2.3%	$1,482
23.4%	1.36%	$661	46.8%	2.3%	$1,487
11.0%	1.25%	$718	59.7%	2.1%	$1,616
19.3%	1.24%	$728	61.8%	2.1%	$1,639
27.7%	1.38%	$654	45.4%	2.3%	$1,472
9.7%	1.18%	$761	69.2%	2.0%	$1,713
10.9%	0.84%	$1,067	137.1%	1.4%	$2,401
12.0%	0.97%	$930	106.8%	1.6%	$2,094
21.4%	0.83%	$1,086	141.3%	1.4%	$2,443
15.1%	1.05%	$860	91.2%	1.7%	$1,936
12.5%	1.09%	$824	83.2%	1.8%	$1,855
11.9%	0.89%	$1,007	123.7%	1.5%	$2,265
14.2%	0.84%	$1,067	137.1%	1.4%	$2,400
18.8%	1.71%	$527	17.1%	2.8%	$1,186
16.9%	0.83%	$1,090	142.2%	1.4%	$2,452
17.8%	1.00%	$897	99.4%	1.7%	$2,019
26.1%	0.94%	$962	113.7%	1.6%	$2,164
15.1%	0.74%	$1,218	170.6%	1.2%	$2,739
10.1%	0.88%	$1,023	127.2%	1.5%	$2,301
21.0%	0.85%	$1,057	134.8%	1.4%	$2,378
13.6%	0.55%	$1,630	262.1%	0.9%	$3,667
14.3%	1.78%	$505	12.3%	3.0%	$1,137
11.2%	1.08%	$834	85.4%	1.8%	$1,877
11.9%	1.39%	$648	44.0%	2.3%	$1,458
14.1%	0.87%	$1,035	130.0%	1.4%	$2,329
8.7%	0.61%	$1,465	225.6%	1.0%	$3,297
8.5%	1.05%	$857	90.5%	1.8%	$1,928

13.2%	0.94%	$956	112.5%	1.6%	$2,152
14.3%	0.76%	$1,181	162.4%	1.3%	$2,656
21.1%	1.32%	$684	52.1%	2.2%	$1,540
22.2%	1.04%	$866	92.5%	1.7%	$1,950
17.4%	0.62%	$1,460	224.4%	1.0%	$3,284
7.0%	0.64%	$1,406	212.5%	1.1%	$3,164
9.5%	0.79%	$1,137	152.6%	1.3%	$2,557
8.0%	0.83%	$1,080	139.9%	1.4%	$2,429
36.7%	1.00%	$902	100.4%	1.7%	$2,029
16.9%	0.66%	$1,367	203.7%	1.1%	$3,075
17.1%	1.15%	$781	73.5%	1.9%	$1,757
26.1%	1.04%	$866	92.4%	1.7%	$1,948
26.1%	0.68%	$1,332	196.1%	1.1%	$2,998
12.8%	0.84%	$1,074	138.7%	1.4%	$2,417
16.9%	0.77%	$1,167	159.4%	1.3%	$2,626
17.4%	0.83%	$1,080	140.0%	1.4%	$2,430
11.7%	0.86%	$1,052	133.8%	1.4%	$2,367
13.4%	0.68%	$1,321	193.5%	1.1%	$2,971
22.8%	0.88%	$1,024	127.7%	1.5%	$2,305
28.3%	0.82%	$1,096	143.6%	1.4%	$2,467
16.1%	0.68%	$1,324	194.3%	1.1%	$2,980
9.1%	0.72%	$1,243	176.3%	1.2%	$2,797
473.0%	1.02%	$881	95.8%	1.7%	$1,983
32.8%	0.90%	$996	121.3%	1.5%	$2,241
29.8%	0.57%	$1,575	250.0%	1.0%	$3,544
18.7%	0.34%	$2,637	486.0%	0.6%	$5,933
13.5%	0.58%	$1,541	242.5%	1.0%	$3,468
62.6%	0.93%	$963	114.0%	1.6%	$2,166
14.5%	1.02%	$886	96.9%	1.7%	$1,994
14.6%	0.93%	$963	114.1%	1.6%	$2,167
23.6%	0.62%	$1,441	220.3%	1.0%	$3,243
13.8%	0.80%	$1,127	150.4%	1.3%	$2,536
25.8%	3.03%	$297	NA	5.1%	$668
25.2%	1.32%	$684	51.9%	2.2%	$1,538
25.1%	1.31%	$689	53.2%	2.2%	$1,551
39.7%	1.14%	$790	75.6%	1.9%	$1,778
39.6%	2.08%	$433	NA	3.5%	$975
21.3%	1.73%	$520	15.6%	2.9%	$1,170
40.6%	1.95%	$463	2.8%	3.2%	$1,041
23.8%	0.65%	$1,380	206.7%	1.1%	$3,105
3.1%	0.52%	$1,738	286.3%	0.9%	$3,911
52.1%	0.65%	$1,380	206.6%	1.1%	$3,104
19.5%	0.48%	$1,889	319.8%	0.8%	$4,250
15.0%	0.57%	$1,568	248.5%	1.0%	$3,528
19.4%	0.98%	$922	104.8%	1.6%	$2,074

16.3%	1.41%	$639	42.0%	2.3%	$1,438
164.3%	2.73%	$330	NA	4.5%	$743
104.1%	0.94%	$957	112.7%	1.6%	$2,154
39.8%	0.31%	$2,878	539.5%	0.5%	$6,475
#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
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% increase that would make average total bill equal to 4.5% of MHI
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165.5%
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402.0%
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3. Percentage of households at different levels of affordability
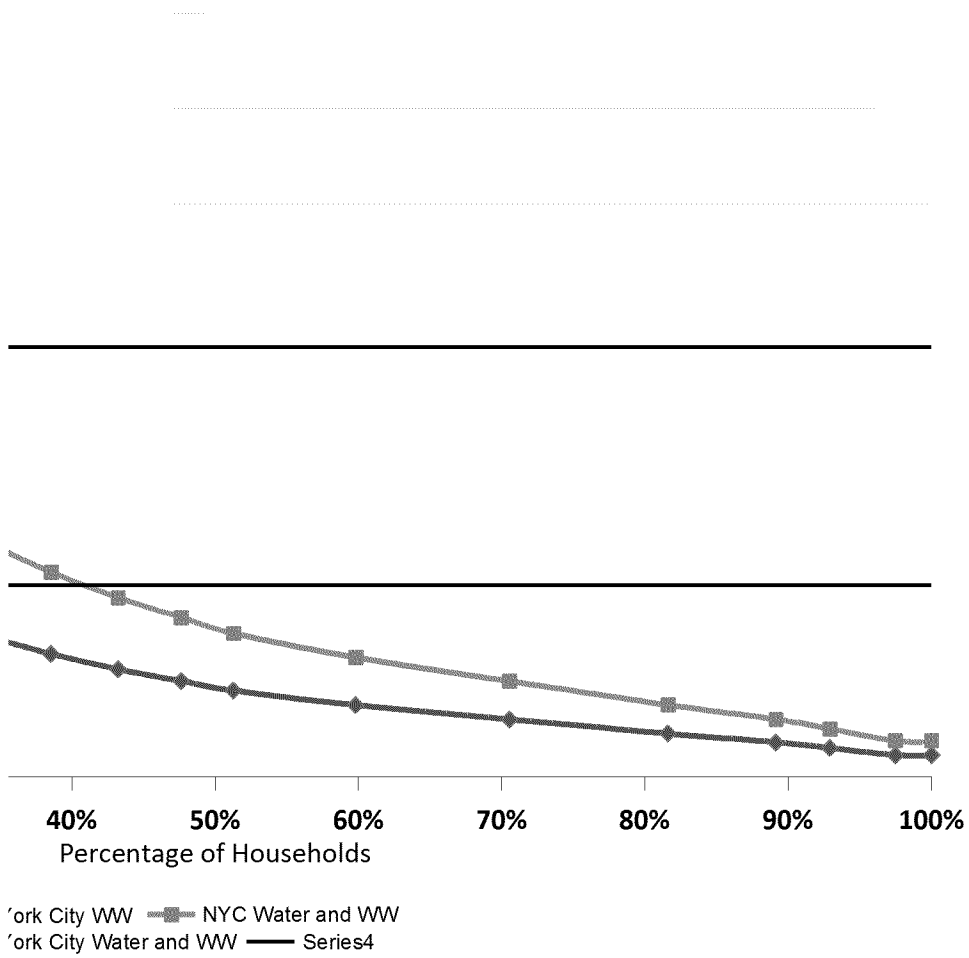
Example City: Sacramento, CA

Average wastewater bill	$ 450.00
Average water bill	$ 300.00
Average combined water and wastewater bill	$ 750.00
Total households (2011)	170,999

Sacramento, CA

Income category	Upper end of income bracket	Household WW costs, % of Income level	Total water and WW costs, % of income level	Households withn income bracket	% of households within income bracket
Less than $10,000	$ 10,000	4.50%	7.50%	13,099	7.66%
$10,000 to $14,999	$ 14,999	3.00%	5.00%	15,094	8.83%
$15,000 to $19,999	$ 19,999	2.25%	3.75%	8,583	5.02%
$20,000 to $24,999	$ 24,999	1.80%	3.00%	10,132	5.93%
$25,000 to $29,999	$ 29,999	1.50%	2.50%	10,305	6.03%
$30,000 to $34,999	$ 34,999	1.29%	2.14%	8,695	5.08%
$35,000 to $39,999	$ 39,999	1.13%	1.88%	8,020	4.69%
$40,000 to $44,999	$ 44,999	1.00%	1.67%	7,543	4.41%
$45,000 to $49,999	$ 49,999	0.90%	1.50%	6,210	3.63%
$50,000 to $59,999	$ 59,999	0.75%	1.25%	14,607	8.54%
$60,000 to $74,999	$ 74,999	0.60%	1.00%	18,351	10.73%
$75,000 to $99,999	$ 99,999	0.45%	0.75%	18,907	11.06%
$100,000 to $124,999	$ 124,999	0.36%	0.60%	12,901	7.54%
$125,000 to $149,999	$ 149,999	0.30%	0.50%	6,450	3.77%
$150,000 to $199,999	$ 199,999	0.23%	0.38%	7,807	4.57%
$200,000 or more	$ 200,000	0.23%	0.38%	4,295	2.51%

% of households within income bracket, cumulative	WW %MHI threshold	Total bill % MHI threshold	Graph
7.66%	2.00%	4.50%	0%
16.49%	2.00%	4.50%	0%
21.51%	2.00%	4.50%	0%
27.43%	2.00%	4.50%	0%
33.46%	2.00%	4.50%	0%
38.54%	2.00%	4.50%	0%
43.23%	2.00%	4.50%	0%
47.64%	2.00%	4.50%	0%
51.28%	2.00%	4.50%	0%
59.82%	2.00%	4.50%	0%
70.55%	2.00%	4.50%	0%
81.61%	2.00%	4.50%	0%
89.15%	2.00%	4.50%	0%
92.92%	2.00%	4.50%	0%
97.49%	2.00%	4.50%	0%
100.00%	2.00%	4.50%	100%

New Y
New Y

0016196

Percentage of Households

'ork City WW ▨ NYC Water and WW
'ork City Water and WW ── Series4
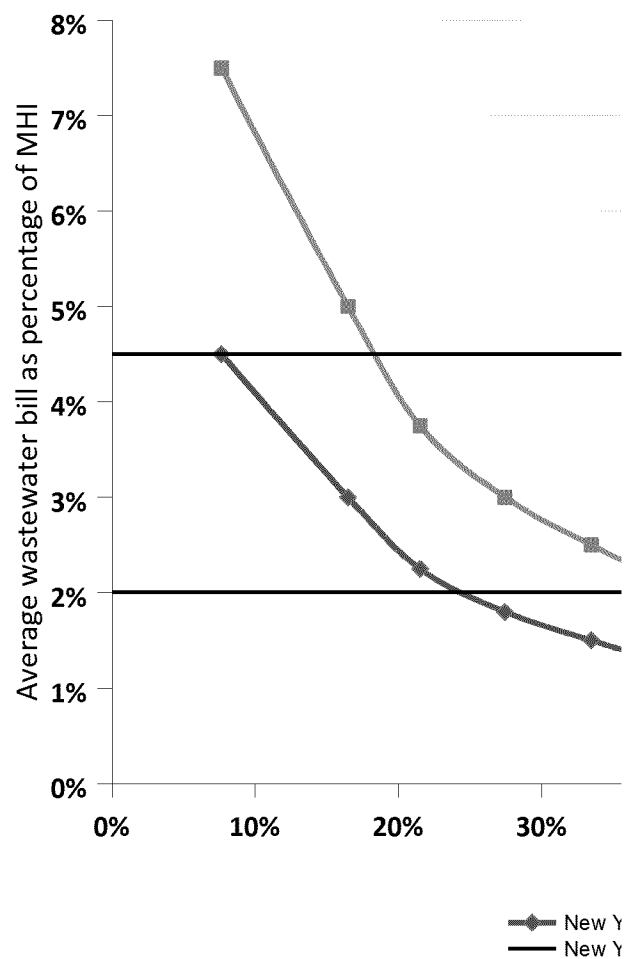
4. Estimated average wastewater bill and total combined bill as a percentage of

Average wastewater bill	$ 450.00
Average water bill	$ 300.00
Average combined water and wastewater bill	$ 750.00

Income category	Percentage of households	MHI within income category	Average wastewater bill as a percentage of MHI	Average total bill as a percentage of MHI	
Less than $20,000	22%	$10,000	4.50%	7.50%	
$20,000 to $39,999	26%	$29,999	1.50%	2.50%	
$40,000 to $74,999	30%	$57,499	0.78%	1.30%	
$75,000 to $99,999	8%	$87,499	0.51%	0.86%	
$100,000 to $199,999	10%	$149,999	0.30%	0.50%	

MHI by income category

5. Average wastewater and total bill as percentage of federal poverty thresho

To evaluate the estimated average wastewater bill as a percentage of poverty level income, the average household bill should be adjusted to account for different household sizes. First, average annual water use can be estimated for different household sizes based on average residential per capita consumption. Wastewater rates can then be applied to average

Average wastewater bill	$ 450.00
Average water bill	$ 300.00
Average combined water and wastewater bill	$ 750.00
Annual household consumption (gallons)	75,000
Average persons per household	2.5

Household or family size	Poverty threshold	Estimated average annual consumption	Estimated average wastewater bill	Estimated average water and wastewater bill
1	$11,170	30,000	$180.00	$300.00
2	$15,130	60,000	$360.00	$600.00
3	$19,090	90,000	$540.00	$900.00
4	$23,050	120,000	$720.00	$1,200.00
5	$27,010	150,000	$900.00	$1,500.00
6	$30,970	180,000	$1,080.00	$1,800.00
7	$34,930	210,000	$1,260.00	$2,100.00
8	$38,890	240,000	$1,440.00	$2,400.00

ld incomes (hypothetical example)

ousehold. To evaluate the estimated average wastewater bill as a percentage of poverty level
sehold sizes. First, average annual water use can be estimated for different household sizes
e applied to average consumption levels to estimate average household wastewater costs.
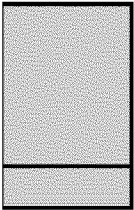
Estimated average WW bill as a percentage of poverty level income (%)	Estimated average water and WW bill as a percentage of poverty level income (%)
1.61%	2.69%
2.38%	3.97%
2.83%	4.71%
3.12%	5.21%
3.33%	5.55%
3.49%	5.81%
3.61%	6.01%
3.70%	6.17%

6. Estimated average water and wastewater bill as a percentage of household

Example City:	Kansas City, KS

	Average annual HH wastewater costs	Average annual HH water costs	Average annual total water and WW costs
All households	$ 450.00	$ 300.00	$ 750.00
Single family	$ 600.00	$ 400.00	$ 1,000.00
Mulit-family	$ 300.00	$ 200.00	$ 500.00
Single family average annual HH consumption	80,000		
Multi-family average annual HH consumption	52,000		

Household type	MHI, 2011	Estimated average WW bill as a percentage of MHI (%)	Estimated average total bill as a percentage of MHI (%)	
All households	37,036	1.22%	2.03%	
Elderly households	27,955	1.61%	2.68%	
Renter-occupied	24,898	1.81%	3.01%	
Owner-occupied	47,272	0.95%	1.59%	
Multi-family	?		#VALUE!	
Single-family	?		#VALUE!	

income, by household type

7. Adjusting income levels for future years

recommended that you simply assume incomes will increase at the same rate as the Consumer Price Index (CPI). However, in recent years income levels have not kept pace with the CPI, and have even declined in many communities. This can make it difficult to project MHI for your community going forward.

One approach for projecting future income levels is to examine how income levels have changed in recent years in comparison to the CPI (e.g., over the past five years national income levels have increased at a rate of approximately 60% of the increase in CPI). Given the recent economic crisis and recovery process, it seems reasonable to assume that this trend will likely continue, at least for the near future. Thus, to project MHI over the next several years, you may assume that incomes will increase by about 60% (or rate at which your community's MHI has increased relative to CPI) of the forecasted change in CPI (as developed by the Congressional Budget Office, CBO). Beyond the next several years, it may be reasonable to assume that incomes will again begin to increase at the same rate as the CPI.** Although this analysis is not exact, it

This worksheet shows the methodology used to easily adjust future incomes using this methodology (using NY

Assumptions:

Change in NYC MHI 2006–2010:	4.9%
Change in CPI 2006–2010:	8.2%
Ratio of MHI increase to CPI change	59.6%

CBO CPI Forecast	2010	2011	2012	2013	2014	2015
		2.90%	1.50%	1.30%	1.30%	1.80%

BASED ON CBO CPI FORECAST: For 2011–2015, MHI increases based on the ratio of MHI change to CPI ch

	2010	2011	2012	2013	2014	2015
		1.7297%	0.8947%	0.7754%	0.7754%	1.0736%
	$ 48,743	$ 49,586	$ 50,030	$ 50,418	$ 50,809	$ 51,354

**Depending on economic trends, this method may warrant adjsutment over the next few years

cessary to make some assumptions about how income levels will change over time.
ame rate as the Consumer Price Index (CPI). However, in recent years income levels
difficult to project MHI for your community going forward.

in recent years in comparison to the CPI (e.g., over the past five years national
cent economic crisis and recovery process, it seems reasonable to assume that this
years, you may assume that incomes will increase by about 60% (or rate at which
ed by the Congressional Budget Office, CBO). Beyond the next several years, it may
Although this analysis is not exact, it does provide a general idea of how income

ogy (using NYC as our example city).

	2016	2017	2018	2019	2020	
	2.10%	2.30%	2.30%	2.30%	2.30%	2.30%

nge to CPI change from 2006–2010. For 2016–2020, MHI increases based on CPI Forecast

2016	2017	2018	2019	2020
2.1000%	2.3000%	2.3000%	2.3000%	2.3000%
$ 52,433	$ 53,639	$ 54,872	$ 56,134	$ 57,425

8. Percentage of households at different levels of affordability citywide, futu

Example City: New York City

% increase in rates from 2013 - 2015   20%
% increase in rates from 2013 to 2020   50%

	2013	2015	2020
Average wastewater bill	$ 450.00	$ 540.00	$ 675.00
Average water bill	$ 300.00	$ 360.00	$ 450.00
Average combined water and wastewater bill	$ 750.00	$ 900.00	$ 1,125.00
Total households	3,023,330	3,023,330	3,023,330

2013

Income category	Upper end of income bracket	Households WW costs, % of income level	Total water and WW costs, % of income level	Households within income bracket
Less than $10,000	$ 10,000	4.50%	7.50%	336,074
$10,000 to $14,999	$ 14,999	3.00%	5.00%	198,383
$15,000 to $19,999	$ 19,999	2.25%	3.75%	176,613
$20,000 to $24,999	$ 24,999	1.80%	3.00%	170,415
$25,000 to $29,999	$ 29,999	1.50%	2.50%	141,985
$30,000 to $34,999	$ 34,999	1.29%	2.14%	142,749
$35,000 to $39,999	$ 39,999	1.13%	1.88%	122,382
$40,000 to $44,999	$ 44,999	1.00%	1.67%	128,938
$45,000 to $49,999	$ 49,999	0.90%	1.50%	103,000
$50,000 to $59,999	$ 59,999	0.75%	1.25%	205,087
$60,000 to $74,999	$ 74,999	0.60%	1.00%	269,368
$75,000 to $99,999	$ 99,999	0.45%	0.75%	318,390
$100,000 to $124,999	$ 124,999	0.36%	0.60%	221,018
$125,000 to $149,999	$ 149,999	0.30%	0.50%	131,400
$150,000 to $199,999	$ 199,999	0.23%	0.38%	157,683
$200,000 or more	$ 200,000	0.23%	0.38%	199,845

2015

Income category	Upper end of income bracket	Households WW costs, % of income level	Total water and WW costs, % of income level	Households within income bracket
Less than $10,000	$ 10,000	5.40%	9.00%	336,074
$10,000 to $14,999	$ 14,999	3.60%	6.00%	198,383
$15,000 to $19,999	$ 19,999	2.70%	4.50%	176,613
$20,000 to $24,999	$ 24,999	2.16%	3.60%	170,415
$25,000 to $29,999	$ 29,999	1.80%	3.00%	141,985
$30,000 to $34,999	$ 34,999	1.54%	2.57%	142,749
$35,000 to $39,999	$ 39,999	1.35%	2.25%	122,382
$40,000 to $44,999	$ 44,999	1.20%	2.00%	128,938
$45,000 to $49,999	$ 49,999	1.08%	1.80%	103,000
$50,000 to $59,999	$ 59,999	0.90%	1.50%	205,087
$60,000 to $74,999	$ 74,999	0.72%	1.20%	269,368
$75,000 to $99,999	$ 99,999	0.54%	0.90%	318,390
$100,000 to $124,999	$ 124,999	0.43%	0.72%	221,018
$125,000 to $149,999	$ 149,999	0.36%	0.60%	131,400
$150,000 to $199,999	$ 199,999	0.27%	0.45%	157,683
$200,000 or more	$ 200,000	0.27%	0.45%	199,845

2020

Income category	Upper end of income bracket	Households WW costs, % of income level	Total water and WW costs, % of income level	Households within income bracket
Less than $10,000	$ 10,000	6.75%	11.25%	336,074
$10,000 to $14,999	$ 14,999	4.50%	7.50%	198,383
$15,000 to $19,999	$ 19,999	3.38%	5.63%	176,613
$20,000 to $24,999	$ 24,999	2.70%	4.50%	170,415
$25,000 to $29,999	$ 29,999	2.25%	3.75%	141,985
$30,000 to $34,999	$ 34,999	1.93%	3.21%	142,749
$35,000 to $39,999	$ 39,999	1.69%	2.81%	122,382
$40,000 to $44,999	$ 44,999	1.50%	2.50%	128,938
$45,000 to $49,999	$ 49,999	1.35%	2.25%	103,000
$50,000 to $59,999	$ 59,999	1.13%	1.88%	205,087
$60,000 to $74,999	$ 74,999	0.90%	1.50%	269,368
$75,000 to $99,999	$ 99,999	0.68%	1.13%	318,390
$100,000 to $124,999	$ 124,999	0.54%	0.90%	221,018
$125,000 to $149,999	$ 149,999	0.45%	0.75%	131,400

$150,000 to $199,999	$ 199,999	0.34%	0.56%	157,683
$200,000 or more	$ 200,000	0.34%	0.56%	199,845

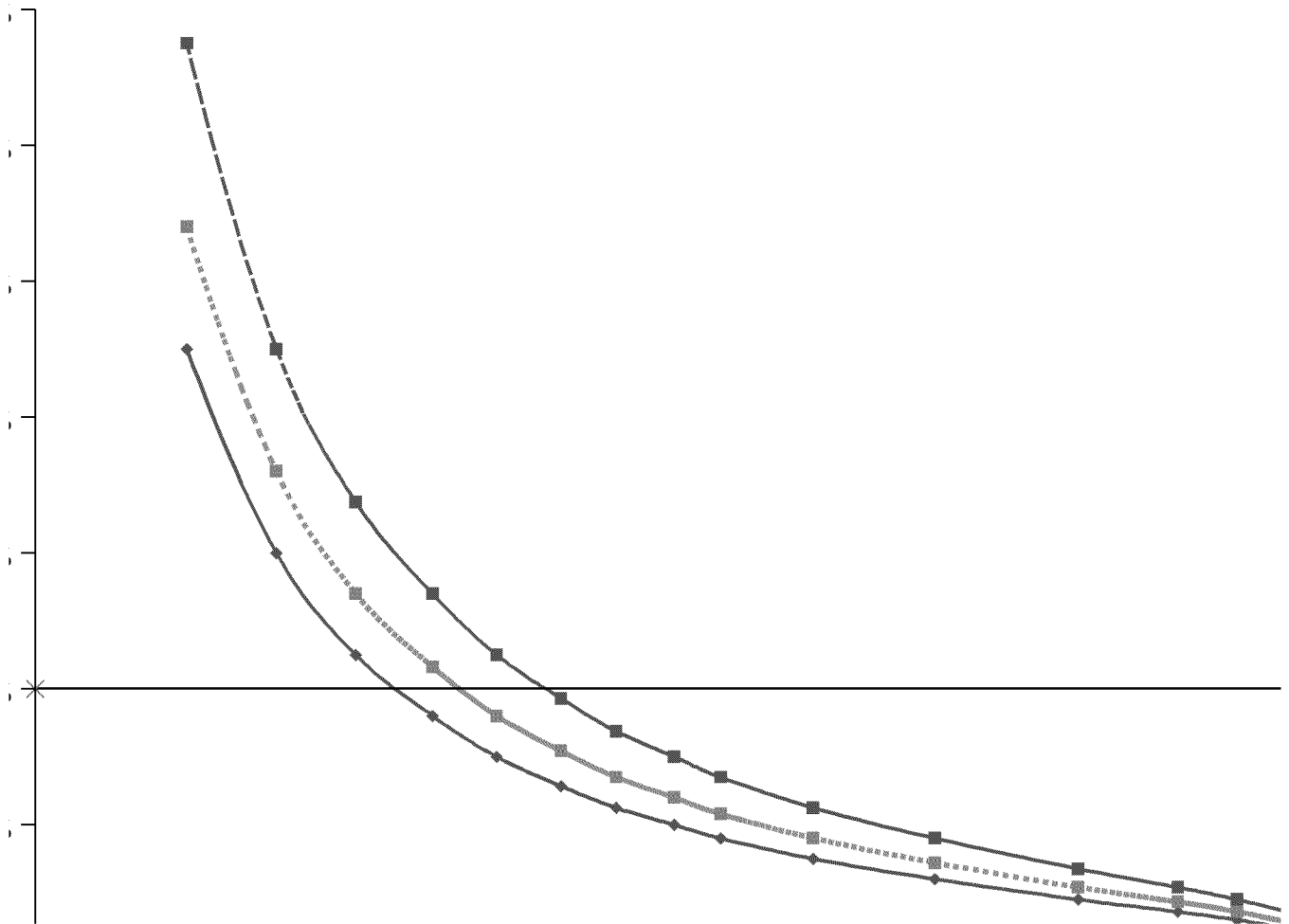| % of households within income bracket	% of households within income bracket, cumulative	WW %MHI threshold	Total bill % MHI threshold	Graph
11.12%	11.12%	2.00%	4.50%	0%
6.56%	17.68%	2.00%	4.50%	0%
5.84%	23.52%	2.00%	4.50%	0%
5.64%	29.16%	2.00%	4.50%	0%
4.70%	33.85%	2.00%	4.50%	0%
4.72%	38.57%	2.00%	4.50%	0%
4.05%	42.62%	2.00%	4.50%	0%
4.26%	46.89%	2.00%	4.50%	0%
3.41%	50.29%	2.00%	4.50%	0%
6.78%	57.08%	2.00%	4.50%	0%
8.91%	65.99%	2.00%	4.50%	0%
10.53%	76.52%	2.00%	4.50%	0%
7.31%	83.83%	2.00%	4.50%	0%
4.35%	88.17%	2.00%	4.50%	0%
5.22%	93.39%	2.00%	4.50%	0%
6.61%	100.00%	2.00%	4.50%	100%

7%

6%

Average wastewater bill as percentage of MHI
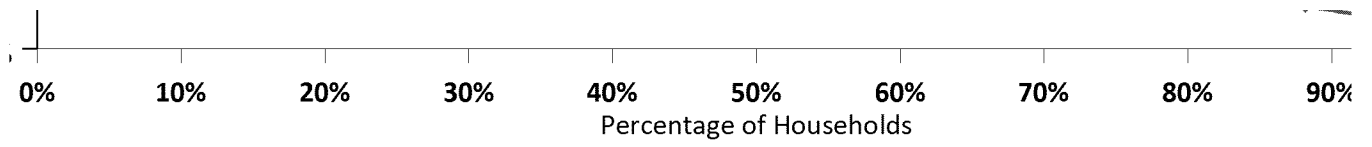
5%

4%

3%

2%

1%

0%

% of households within income bracket	% of households within income bracket, cumulative	WW %MHI threshold	Total bill % MHI threshold	Graph
11.12%	11.12%	2.00%	4.50%	0%
6.56%	17.68%	2.00%	4.50%	0%
5.84%	23.52%	2.00%	4.50%	0%
5.64%	29.16%	2.00%	4.50%	0%
4.70%	33.85%	2.00%	4.50%	0%
4.72%	38.57%	2.00%	4.50%	0%
4.05%	42.62%	2.00%	4.50%	0%
4.26%	46.89%	2.00%	4.50%	0%
3.41%	50.29%	2.00%	4.50%	0%
6.78%	57.08%	2.00%	4.50%	0%
8.91%	65.99%	2.00%	4.50%	0%
10.53%	76.52%	2.00%	4.50%	0%
7.31%	83.83%	2.00%	4.50%	0%
4.35%	88.17%	2.00%	4.50%	0%
5.22%	93.39%	2.00%	4.50%	0%
6.61%	100.00%	2.00%	4.50%	100%

% of households within income bracket	% of households within income bracket, cumulative	WW %MHI threshold	Total bill % MHI threshold	Graph
11.12%	11.12%	2.00%	4.50%	0%
6.56%	17.68%	2.00%	4.50%	0%
5.84%	23.52%	2.00%	4.50%	0%
5.64%	29.16%	2.00%	4.50%	0%
4.70%	33.85%	2.00%	4.50%	0%
4.72%	38.57%	2.00%	4.50%	0%
4.05%	42.62%	2.00%	4.50%	0%
4.26%	46.89%	2.00%	4.50%	0%
3.41%	50.29%	2.00%	4.50%	0%
6.78%	57.08%	2.00%	4.50%	0%
8.91%	65.99%	2.00%	4.50%	0%
10.53%	76.52%	2.00%	4.50%	0%
7.31%	83.83%	2.00%	4.50%	0%
4.35%	88.17%	2.00%	4.50%	0%

5.22%	93.39%	2.00%	4.50%	0%
6.61%	100.00%	2.00%	4.50%	100%

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0%　　　10%　　　20%　　　30%　　　40%　　　50%　　　60%　　　70%　　　80%　　　90%

Percentage of Households

—◆—2013　··■··2015　—■—2020　—✕—Series4

100%